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**SUBHOUSEPIT 3: ASSESSING THE ROLE OF A SMALL
SEMISUBTERRANEAN MAT LODGE IN LATE PLATEAU HORIZON
SETTLEMENT STRATEGIES**

By

Lucille E. Harris

B.A. The University of Montana, Missoula, 2000

Presented in partial fulfillment of the requirements

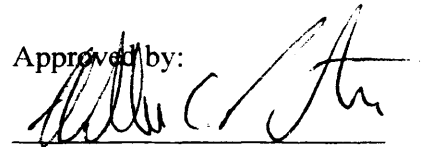
For the degree of

Master of Arts

The University of Montana

May 2004

Approved by:



Chairperson:



Dean, Graduate School:

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Subhousepit 3: Assessing the Role of a Small Semisubterranean Mat Lodge in Late Plateau Horizon Settlement Strategies (82 pp.)

Director: William C. Prentiss



The Keatley Creek winter pithouse village is located in the Mid-Fraser region of the Canadian Plateau. This village is one of the largest documented winter villages in the region and is notable for a lengthy occupational history, spanning both the Lochnore Phase (5500-3500 BP) and the Plateau Pithouse Tradition (3500-200 BP), as well as for a high diversity in house sizes. The University of Montana Field School excavations during the summers of 1999 and 2001 uncovered a small house floor (Subhousepit 3) underlying the northwest corner of the floor of Housepit 7, one of the largest houses at the site. Despite being statistically contemporaneous with the earliest occupation of Housepit 7 at ca. 1700 BP, the stratigraphic relationship of the Subhousepit 3 floor to the large house indicates that occupation this structure immediately preceded the construction of Housepit 7. The temporal positioning of Subhousepit 3, immediately prior to the construction of Housepit 7 and the subsequent development of cultural complexity in the region, provides researchers with a unique opportunity to examine changes in economy and settlement strategies associated with the rise of large socially complex houses in a very narrow time frame.

However, before these studies can be undertaken, it is necessary to determine if Subhousepit 3 is truly an independent winter residence or if it could have served another function, such as a room attached to Housepit 7, a short term (and potentially warm season) occupation, or a special activity structure. The goal of this thesis is to infer the type of occupation represented by Subhousepit 3 from the lithic materials recovered from the floor deposits. This study concludes with a comparison of Subhousepit 3 data to two later small houses, Housepit 12 and Housepit 90, from the Keatley Creek village and a discussion of research implications.

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CHAPTER 1: INTRODUCTION

The Keatley Creek winter pithouse village is located in the mid-Fraser region of the Canadian Plateau (Figure 1-1). This village is one of the largest on record for the mid-Fraser region with 119 houses visible on the ground surface (Figure 1-2.) This village is also notable for an extreme range in house size, from 2.5 meters to over 25 meters in diameter. Housepit occupations at this site span the Plateau Pithouse Tradition (PPT) (Richards and Rousseau 1987), beginning possibly as early as ca. 3500 BP and continuing through contact times ca. 200 BP.

The Plateau Pithouse Tradition is composed of three cultural horizons: the Shuswap Horizon (ca. 3500-2400 BP), the Plateau Horizon (ca. 2400-1200 BP), and the Kamloops Horizon (ca. 1200-200 BP). These subdivisions are united under the PPT on the basis of broad shared characteristics, including the widespread use of pithouses as winter residences and the associated adoption of a logistical collecting strategy focused, to a greater or lesser degree, on the procurement and storage of large quantities of salmon. However, variability does exist between the three cultural horizons (Table 1-1).

Table 1-1. Attributes of the Plateau Pithouse Tradition by Cultural Horizon.

Cultural Horizon	Plateau Pithouse Tradition		
	Shuswap	Plateau	Kamloops
Years BP	3500-2400	2400-1200	1200-200
Avg. House Size	10.7 m	6 m	8.5 m
Storage Pits	Internal Only	Internal/External	(widest range in house size) Internal/External (attain size of small houses)
Subsistence	Primary: Mammalian Secondary: Salmon	Primary: Salmon Secondary: Mammalian	Primary: Mammalian Secondary: Salmon
Art and Status Items	Rare	Occasional	Common
Other	N/A	Bow and Arrow by 1500 BP	First Groundstone: Adzes, slate knives, mauls

The trend through time is towards diversification in the range of winter house sizes, where the Shuswap Horizon exhibits the highest degree of conformity in house size and the Kamloops Horizon exhibits the highest degree of variance in house size. Coupled with this change is a shift away from storage and cooking of food exclusively inside houses in the Shuswap Horizon, to both internal and external storage and cooking facilities in the Plateau Horizon, to internal and external storage and cooking facilities in the Kamloops Horizon that attain extravagant proportions, in some cases indistinguishable in size from small houses. A general trend towards toolkit diversification is apparent, with the introduction of bow and arrow technology during the Plateau Horizon and the addition of a well developed groundstone industry during the Kamloops Horizon. Art and status items exhibit the same trend towards increasing frequency and elaboration through time, attaining peak production during the Kamloops Horizon. Underlying all of this is a shifting pattern of resource utilization. The Shuswap Horizon, while becoming less residually mobile through the use of stored salmon, appears to maintain a fairly heavy reliance on mammalian resources. During the Plateau Horizon, the shift is made to almost exclusive use of salmon in the winter houses. By the Kamloops Horizon, a shift is made back to a heavier reliance on mammalian resources, though salmon continue to play an important role in subsistence and winter sedentism. The preceding discussion is based on work by Richards and Rousseau (1987) and Burns (2003).

Field investigations in 1999 revealed a small house floor, Subhousepit 3, underlying the northwest corner of the floor of Housepit 7 (Figures 1-3 and 1-4). At just 2.5 meters in diameter, this floor is significantly smaller than any other house previously

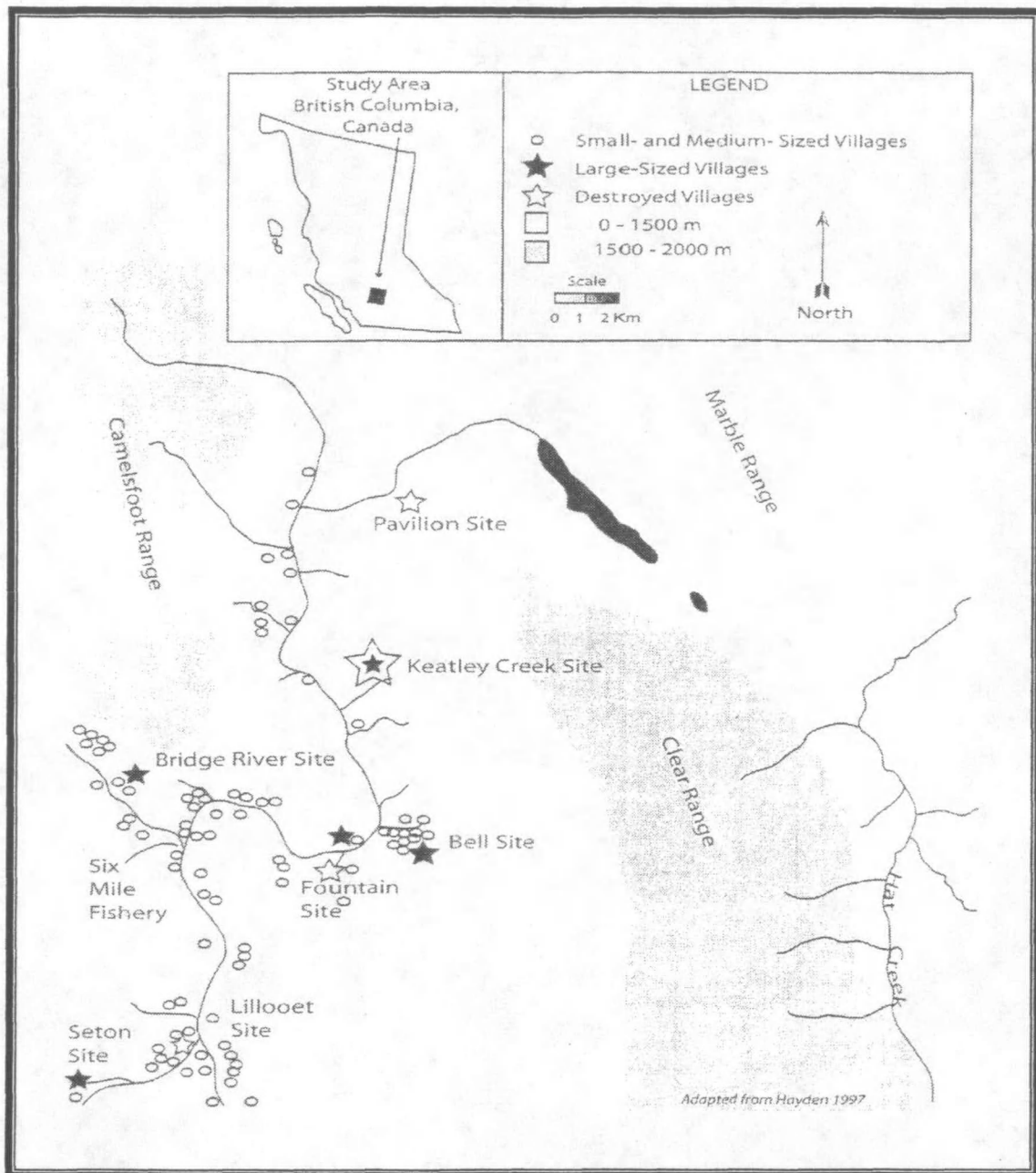


Figure 1-1. Map showing the location of Keatley Creek in the mid-Fraser region (from Prentiss et. al. 2003).

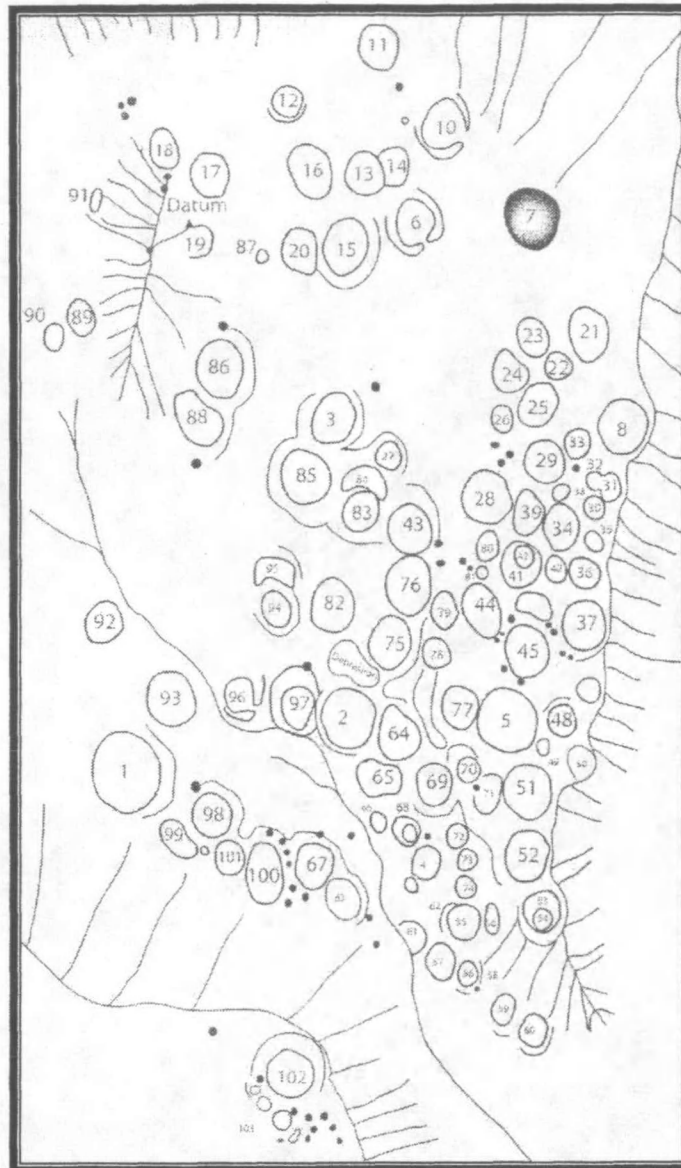


Figure 1-2. Map of the Keatley Creek site highlighting the location of Housepit 7 (from Prentiss et. al. 2003).

documented at Keatley Creek. Despite its unprecedented small size, this floor contained all the hallmarks of a residential structure, including formal prepared floors, hearth features, storage pits (one with 26 articulated salmon vertebrae), and four small postholes, indicating a superstructure with a light wooden framework (Figures 1-5a-c). Due to its stratigraphic position, it is clear that Subhousepit 3 was excavated into the ground, in the fashion of a typical pithouse. However, due to the complexities of site formation and the subsequent construction of Housepit 7 over the top of Subhousepit 3, it is unclear exactly how deeply this structure was excavated. All four of the identified postholes measure approximately 9 cm in diameter, suggesting that the superstructure of this house was most consistent with ethnographically documented mat lodges, shown in Figure 1-6 (Teit 1900; Teit 1906). Teit's work documents use of mat lodges for both summer and winter residences by some families. He makes no mention of these structures being semi-subterranean, but it is logical to infer that a mat lodge superstructure might be erected over an excavated pit for a winter residence due to the greater insulative effect of the housepit. There are examples of this type of house construction from the Columbia Plateau (Ames et al. 1998).

There are three levels of occupation contained within the floor deposits of this house, as defined by the stratigraphic positioning of hearth features and storage pits within the floor deposits (Figures 1-5a-c). Despite its small size, this structure was repeatedly occupied for a number of years. Two carbon 14 dates were taken from the last occupation surface of this house floor, both of which returned dates of 1700 BP. This thesis focuses on the technological organization surrounding the use of lithic materials recovered from Subhousepit 3.

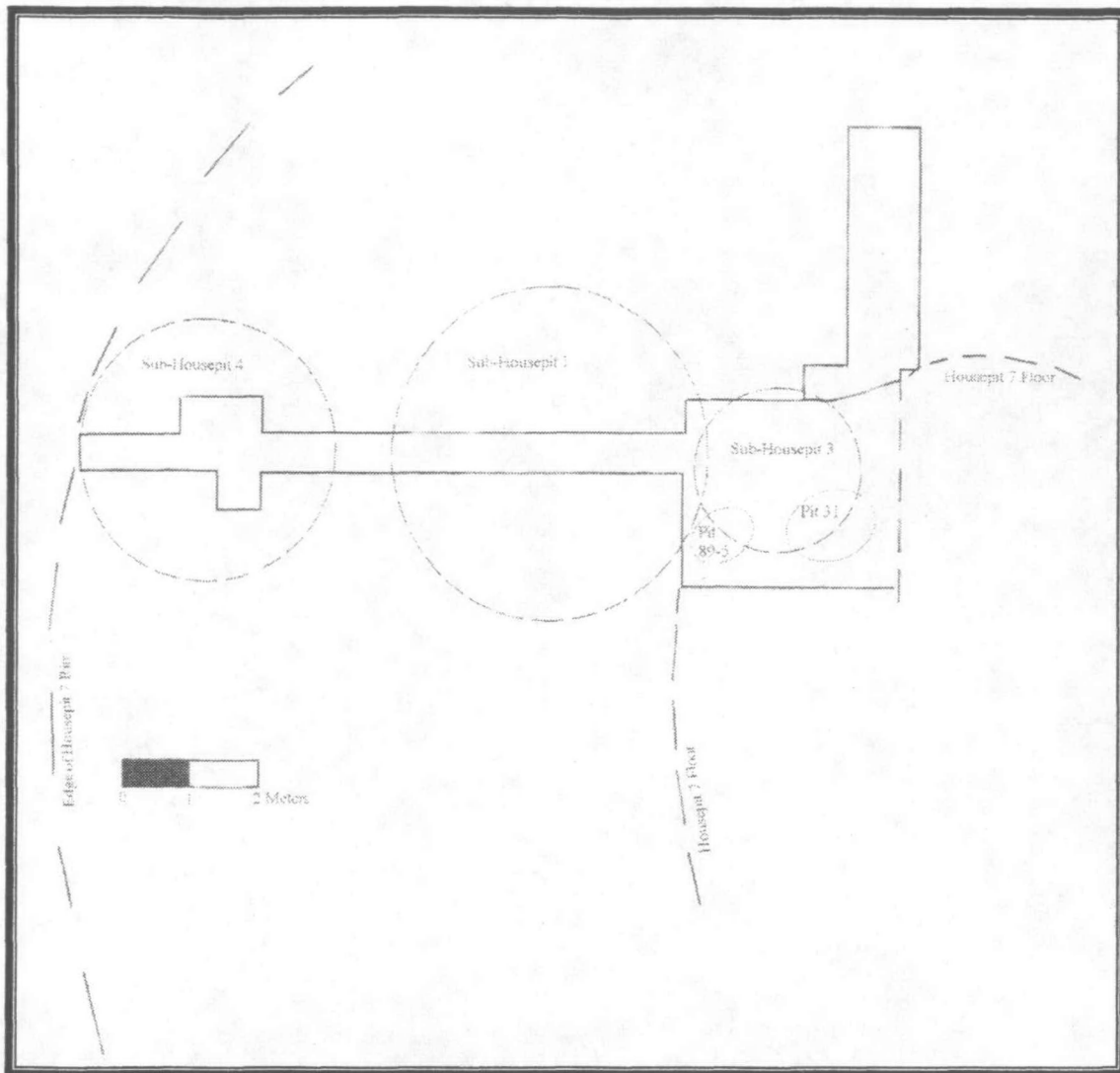


Figure 1-3. Map illustrating the horizontal relationship of Subhousepit 3 to Housepit 7 (from Prentiss et. al. 2002).

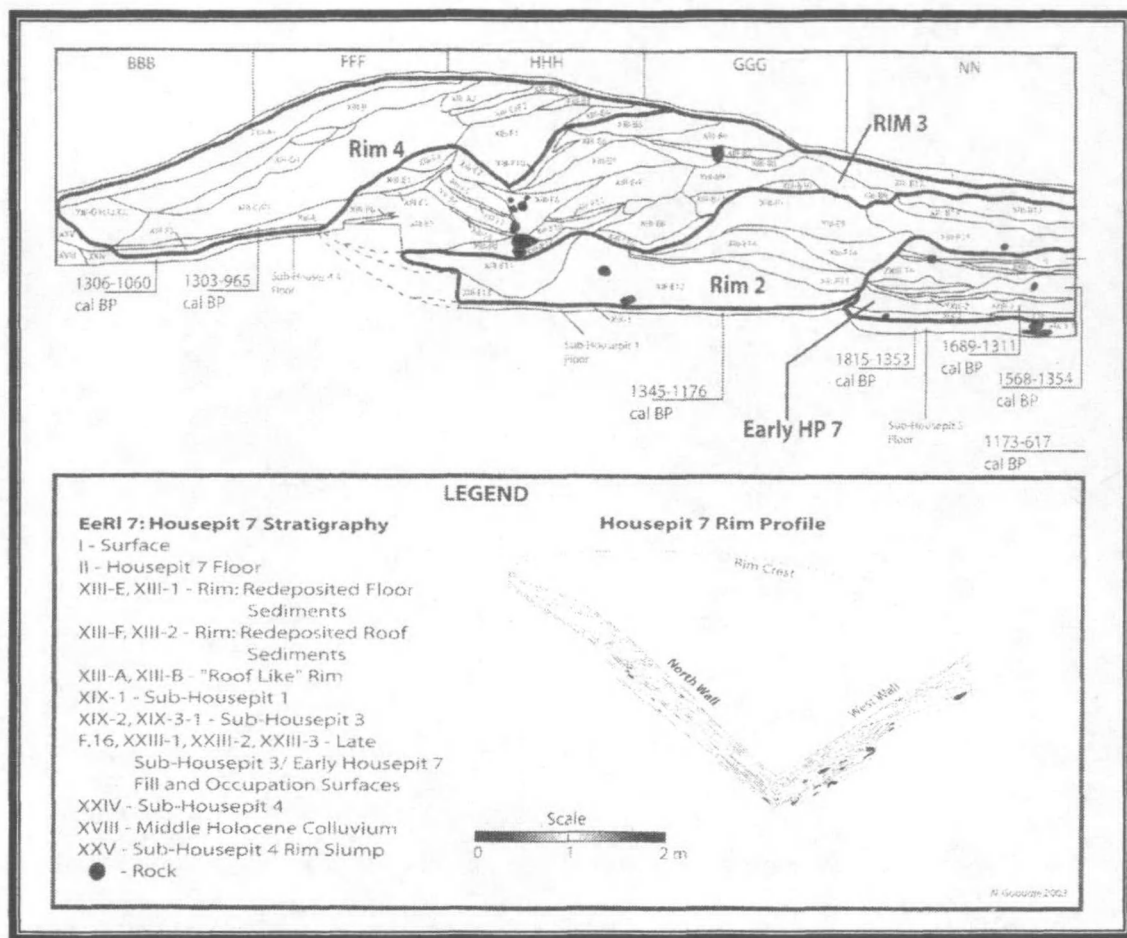


Figure 1-4. Map illustrating the vertical relationship between Subhousepit 3 and Housepit 7 (from Prentiss et al. 2003).

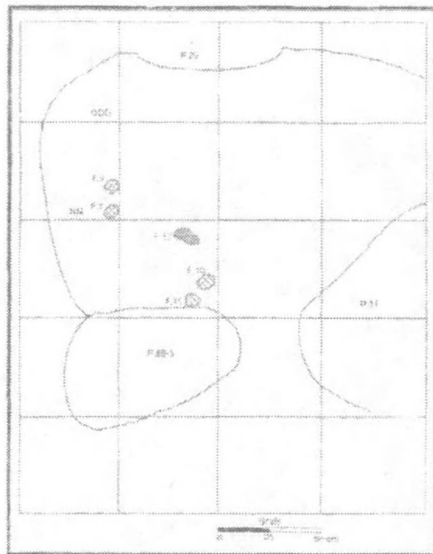


Figure 1-5a. Subhousepit 3 Level 1.

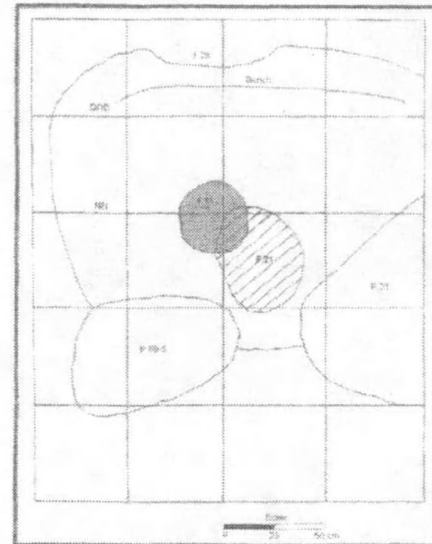


Figure 1-5b. Subhousepit 3 Level 2.

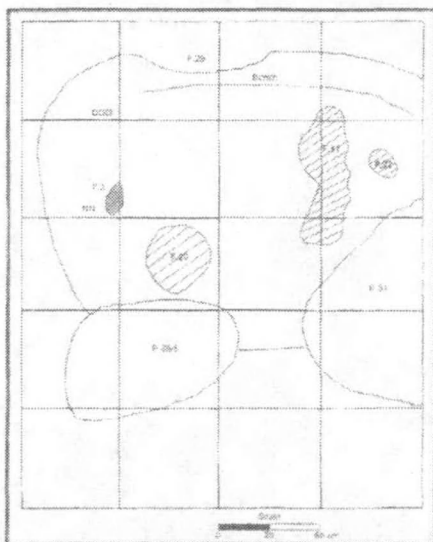


Figure 1-5c. Subhousepit 3 Level 3

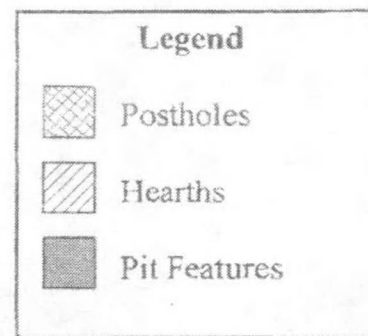


Figure 1-5. Planview maps of Subhousepit 3 occupational floors and associated features (from Prentiss et al. 2002).

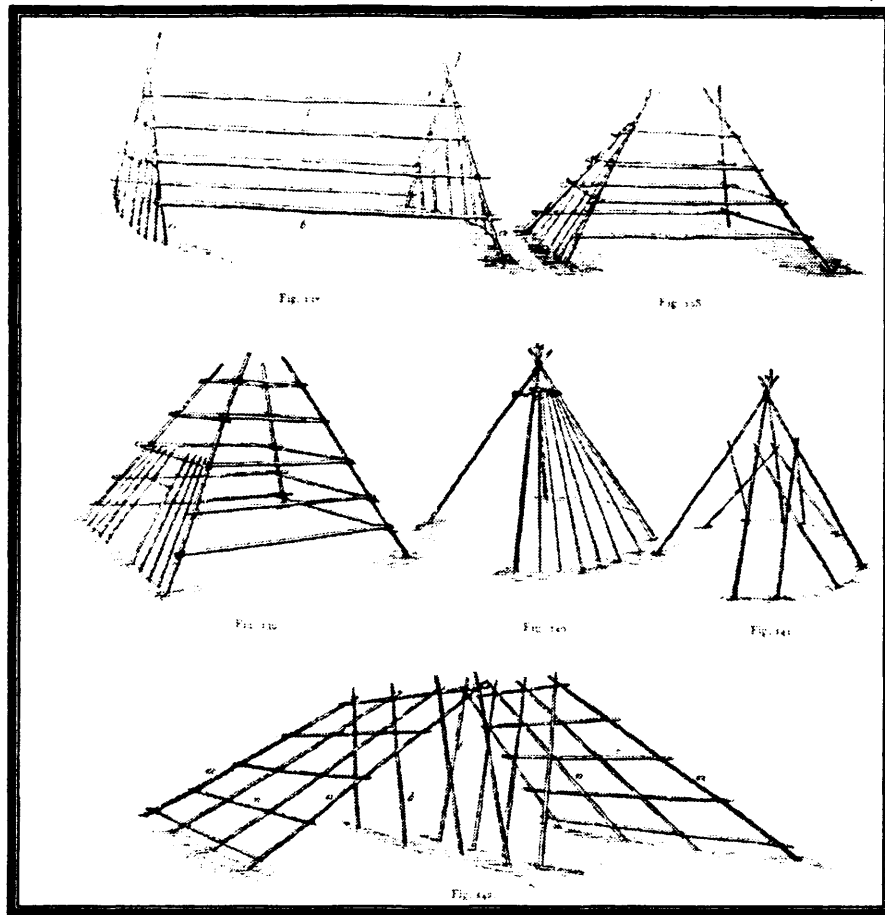


Figure 1-6. Ethnographically documented mat lodge frameworks (from Teit 1900).

HISTORY OF RESEARCH

Beginning with the advent of the new archaeology in the late 1960's, archaeology shifted from viewing cultures and artifacts in purely morphological and functional terms, to understanding cultures and their material by-products as a system that could help to address questions regarding processes of social and economic change. The study of technological organization has its roots in this revolution and seeks to understand how assemblages form and why different assemblages created by the same group look different. Following Kelly (1988), technological organization is defined as

“...the spatial and temporal juxtaposition of the manufacture of different tools within a cultural system, their use, reuse, and discard, and their relation not only to tool function and raw material type and distribution, but also to behavioral variables which mediate the spatial and temporal relations among activity, manufacturing, and raw material loci. Research on the organization of technology aims to elucidate how technological changes reflect large-scale behavioral changes in a prehistoric society.”

Lewis Binford has played a significant role in promoting the study of the organization of technology, beginning with his ethnoarchaeological research with the Nunamiut (1977; 1979) and later with implications arising from his model of hunter-gatherer mobility strategies (the forager-collector continuum) (1980). Subsequent to his research, others began to systematically test relationships between hunter-gatherer mobility practices and differing strategies of raw material use (Parry and Kelly 1987; Shott 1986), demonstrating a strong correlation between expedient tool use and sedentism on the one hand and formal, maintainable, and versatile tools and high residential mobility on the other. Later work (Andrefsky 1994; Bamforth 1986) has demonstrated that the distribution and availability of lithic material across the landscape is a major constraint on how raw materials are used.

Previous lithic studies at the Keatley Creek village have focused primarily on examining socioeconomic differences within and between houses and the social division of space within houses (Spafford 1991; Spafford 2000a; Heffner 2000). However, other studies include lithic raw material sourcing (Rousseau 2000) and issues surrounding technological organization and assemblage formation (Hayden et al 2000; Prentiss 1993; Prentiss 2000).

Hayden et al (2000) examined the different tool and core types present in the Keatley assemblage and identified six major groupings of tools and cores based on differential tool function and design criteria. These six groupings, referred to as strategies, include 1) the expedient block core reduction and flake tool manufacturing strategy, 2) the bifacial strategy, 3) the portable flake tool strategy (which includes curated flake tools such as end scrapers and key shaped scrapers), 4) the quarried bipolar strategy, 5) the scavenged bipolar strategy, and 6) the ground stone strategy. Each of these strategies reflects a technological response to a variety of constraints including specific task requirements, lithic material availability, lithic material suitability for specific tasks, and mobility. This work contributes significantly to our understanding of lithic material acquisition, tool manufacture, and use at Keatley Creek and follows from the precedent established by Binford and O'Connell (1984) that technological strategies of any given group of people can be internally differentiated based on different requirements associated with each tool class.

Prentiss (2000), using ethnographic data, identified the main economic constraints operating on the manufacture, use, reuse, and discard of tools in winter pithouses, and created a model that describes in general terms what an assemblage created under

conditions of long term winter residence should look like. This model was then applied to the lithic assemblage from Housepit 7 to test the possibility that similar activities and economic decisions governed the formation of lithic assemblages in prehistoric houses. This work is invaluable in that it provides researchers with a powerful analytical tool to assess change through time in housepit function and occupation duration.

RESEARCH PROBLEM

A great deal of attention has been paid to issues of social organization within the Keatley Creek village, to apparent status or wealth based inequalities between residents of the large houses and residents of the smaller houses (Hayden 1997; Lepofsky et al 1996; Kusmer 2000; Spafford 2000a; Spafford 1991). Recent research (Lenert 2001; Prentiss et al. 2003) indicates that the formation of large socially complex villages, such as Keatley Creek, was a relatively late and short lived phenomenon. Beginning around 1600 BP, populations began packing into optimal resource locales along major tributaries, triggering a social reorganization seen archaeologically as a shift from single family residences to multi-family co-residences (Prentiss et al. 2003), from which evidence for substantial wealth based inequalities among the constituent families has been documented through the studies of socioeconomy noted above. At 1700 BP, Subhousepit 3 would have been constructed and occupied immediately prior to or concurrent with the beginnings of this demographic shift and the emergence of overt status inequalities.

Despite general similarities with other documented winter houses, the variance in size and construction of Subhousepit 3 from typical winter residences raises questions about the role of this house within the overall settlement and subsistence system of the

Late Plateau Horizon at the Keatley Creek village. Alexander (2000) notes that the very elderly, the infirm, or the very young were frequently left behind in the winter villages during the warm season and that winter villages may have been returned to frequently throughout the warm season to stockpile collected resources such as lithic material and harvested and processed roots, and they may have served as a short term camps during berry picking season. This information sets a precedent for potential non-winter residential structures or occupations at the winter village locus. Due to the unique aspects of Subhousepit 3, it is necessary to determine if this house represents a long term winter occupation or if it could represent a shorter term occupation, warm or cold season, or a special purpose structure such as a menstrual isolation hut.

If Subhousepit 3 is consistent with a long term winter habitation, access to lithic raw material would be constrained to what had been stockpiled in the house during the warm season and manufacturing techniques should be oriented towards the production of expedient flake tools. Exhaustive use of available material should be evident through recycling of discarded tools for the same or new purposes and bipolar reduction of exhausted cores and tools. A wide array of tool types should be present, reflecting a full suite of domestic activities, ranging from food preparation to the production and maintenance of gear, generally reflected through a high incidence of woodworking tools. In short, the lithic assemblage should be indicative of downtime gearing up activities. In contrast, a short term occupation would be reflective of a period of higher residential mobility and should exhibit a focus on curated lithic technology, potentially less manufacturing activities and more maintenance activities. Tool diversity is expected to be low and reflect a narrow range of activities associated with the purpose or season of

the occupation. Special purpose structures are expected to have a very narrow range of activities represented.

Subhousepit 3 provides the opportunity to examine a variant house form, how it relates to seasonal movements prehistorically, and implications for economic and behavioral constraints on the manufacture, use, reuse, and discard of lithic materials.

SIGNIFICANCE OF RESEARCH

The significance of this research lies in its potential to illuminate the effects of such a large scale demographic shift on mobility strategies, as regards patterning in the timing and frequency of residential moves in the seasonal round, since there is a strong correlation between mobility and the organization of lithic technology (Parry and Kelly 1987; Shott 1986). Recent research has identified this critical transitional period in the prehistory of the mid-Fraser region, but as of yet the full significance of this transition on subsistence and mobility is poorly understood. This thesis provides an initial assessment of the lithic assemblage of a small variant house form of the Late Plateau Horizon and explores implications of the findings for seasonal mobility patterns and long term trends in lithic manufacturing strategies across the transition from dispersed to aggregated wintering conditions.

THESIS OUTLINE

This thesis is organized as follows. Chapter 2, Methods, presents and discusses the analytic methods used to interpret the lithic data from Subhousepit 3. Chapter 3, Results, contains an application and analysis of the methods presented in Chapter 2 to the Subhousepit 3 data. Chapter 4, Discussion, interprets the data and assesses the function of Subhousepit 3 within the overall subsistence and settlement system of the Late Plateau

Horizon at Keatley Creek. A comparison to other small houses post dating the onset of population aggregation is made and an understanding of the effects of aggregation on technological organization and its implications for mobility is made. Finally, Chapter 6, Conclusions, summarizes the research, discusses implications of the research, and offers avenues for future research.

CHAPTER 2

RESEARCH METHODS

This thesis is concerned with the role played by Subhousepit 3 within the settlement and subsistence system of the Late Plateau Horizon on the Canadian Plateau. Specific questions to be addressed include whether Subhousepit 3 actually represents a domestic structure or if it represents a special activity structure, whether the occupation was long term or short term, and ultimately what the Subhousepit 3 data tell us about the stability of long term settlement and subsistence strategies across the transition from dispersed to aggregated wintering conditions (Prentiss et al 2003; Lenert 2001). The analytic methods discussed in this chapter were chosen for their ability to provide information on these three guiding research questions as regards lithic materials.

MINIMUM ANALYTICAL NODULE ANALYSIS

In 1994, Larson introduced minimum analytical nodule analysis, or MANA. This method ideally allows researchers to examine specific production events and activities undertaken at a site, be it stone tool production from a core or resharpening or maintenance of a tool. This method is predicated quite logically on the observation that a nodule, which can be any form of tool stone from a core to a tool to a single flake depending on the form that material was in when brought to the site, can be distinguished from other nodules on the basis of raw material type, color, texture, inclusions, and cortex characteristics. A nodule can represent a single event or a series of events involving the same nodule of material. This method works best with assemblages composed of heterogeneous raw materials. However, the concept of a nodule can be broadened and adapted for use with assemblages composed of more homogenous materials. In this approach, nodules are defined solely on the basis of raw material class.

Several factors combine to make this the most useful approach for the analysis of lithic materials from SHP3. First, though there are ten different raw materials represented in the assemblage, dacite, a highly homogenous material, constitutes 72% of the total lithic artifacts recovered. Second, many cryptocrystalline silicates, such as chert, exhibit a high degree of variability within a single source, making it difficult to accurately distinguish between specific nodules. Despite these difficulties, the application of a coarse level of MANA which considers nodules at the raw material level retains its value for examining differential production, use, reuse, and discard strategies for different lithic material types, and allows insight into the technological organization of the inhabitants of SHP3.

MODIFIED SULLIVAN AND ROSEN TYPOLOGY

In 1985, Sullivan and Rosen presented a debitage classification system which attempted to link specific breakage patterns in a debitage assemblage with specific reduction techniques. Flake breakage categories consisted of complete flakes, broken flakes, flake fragments, split flakes, and debris. Under this system, complete flakes are those platform bearing flakes with all margins intact, proximal flake fragments are platform bearing flakes which lack a distal margin, medial/distal fragments lack a platform and/or distal margin but which retain distinguishable dorsal and ventral surfaces, nonorientable fragments lack a platform and discernable dorsal and ventral surfaces, and finally, split flakes are platform bearing flakes with an intact distal margin, but which exhibit a vertical axis of shearing from proximal to distal ends (Figure 2-1). The Sullivan and Rosen Typology is effective at distinguishing between tool production and core

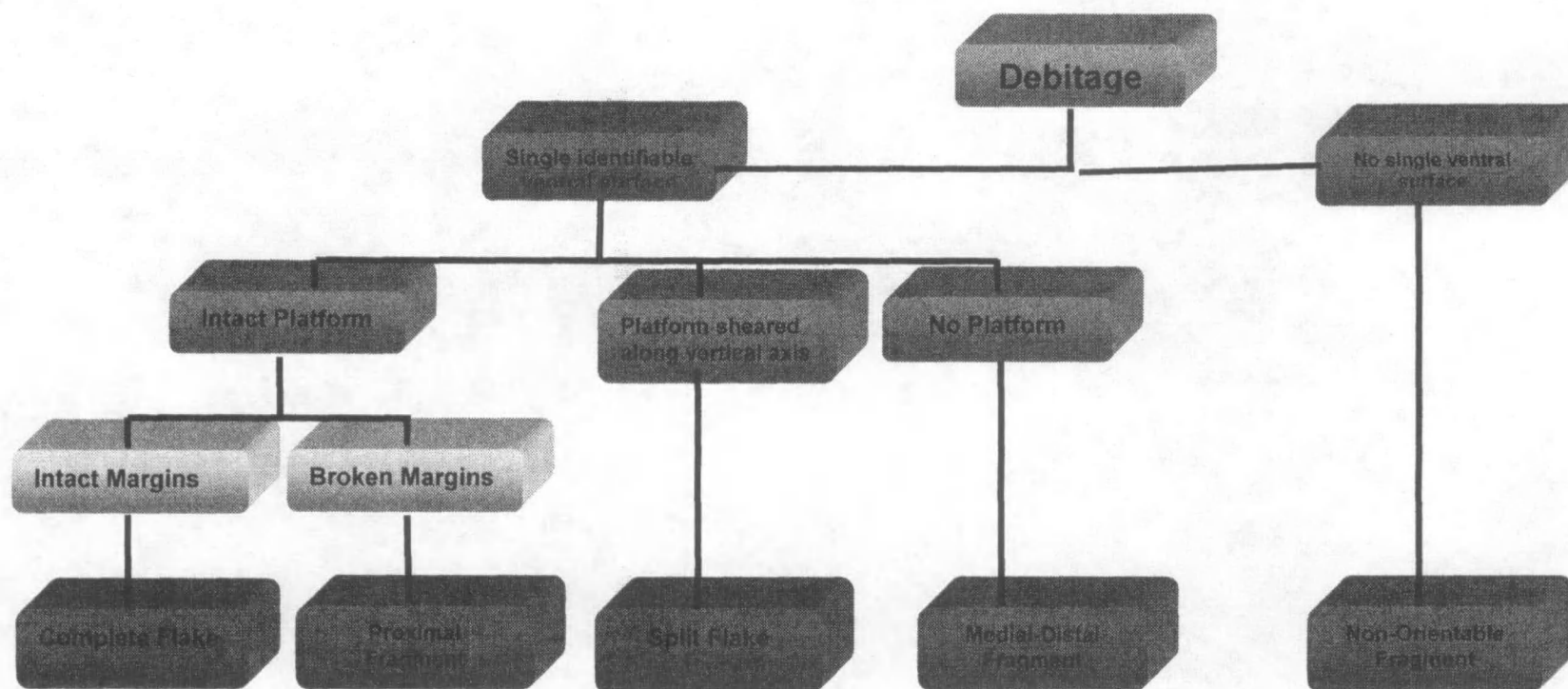


Figure 2-1. Flow chart illustrating criteria for flake classification using the MSRT.

reduction, however, it cannot account for the full range of variability produced by different reduction techniques, raw material variability, or taphonomic processes (Prentiss and Romanski, 1989; Prentiss, 1998). In response to these shortcomings, Prentiss (1998, 2001) developed the Modified Sullivan and Rosen Typology, or MSRT, which retained the use of flake breakage criteria as an indicator of behavioral variation, but which keyed into patterning in flake breakage along a flake size continuum. The addition of flake size as a second dimension of variability helps to tease out finer levels of behavioral variation in any given assemblage. This method has been tested with extensive experimental data (Prentiss 1993; 1998) and has been proven to be both effective and reliable for distinguishing between various core reduction techniques and tool production techniques by demonstrating unique and consistent patterns in flake breakage along the flake size continuum (Prentiss 1993; 1998; 2001) It has also been used to identify the effects of trampling on each assemblage type as well as the selective removal of flakes for use as tools (Prentiss 1993).

The experimental data produced by Prentiss (1998) is used as a baseline against which to assess patterning in the debitage from SHP3. Interpretations are then made on the dominant reduction technique associated with each of the raw material types. The major drawback to this approach lies in its potential to drown out activities which leave very little debitage, such as tool resharpening, by activities which produce larger amounts of debitage such as core reduction. Therefore, with raw materials for which core reduction and tool production occurred we only see with confidence the debitage patterning related to the reduction techniques which leave the largest amount of debris. One way around this problem is to break down the floor area into sectors and to examine

each sector for behavioral differences. In the case of SHP3, two factors combine to make this impractical. First, the unusually small size of the house (2.5 m in diameter) imposes constraints on the division of space within the structure, thereby collapsing activity areas. With a significant degree of overlap between activity areas it is nearly impossible to segregate floor sectors with behaviorally significant differences in debitage. Tool production activities would already be masked by core reduction activities throughout the floor. Second, though we have the benefit of having completely excavated the floor of SHP3, there is a paucity of recovered artifacts, with a total of 353 flakes. Once the debitage have been separated by raw material class, any further reduction in available sample sizes on which to base analyses would effectively cripple pattern recognition. Therefore, despite the potential for this approach to mask activities which produce some variation in debitage, it is considered the most practical approach given the constraints on sample size and activity area distinction.

ALTERNATE DEBITAGE ANALYSES

Initiation type frequency and presence and degree of dorsal cortex were tabulated as independent measures of production techniques. Initiation types were classified as either bend, cone, or wedge initiations. According to Cotterell and Kamminga (1987), in their classic study of fracture mechanics and flake production, cone initiations are most commonly associated with hard hammer percussion, though these initiations are known to occur occasionally with bone or antler pressure flakers. Similarly, bend initiations are most commonly produced during the creation or resharpening of a tool edge through soft hammer percussion or pressure flaking, but are known to occasionally occur during hard hammer reduction. Wedge initiations are generally typical of bipolar reduction, though

hard hammer reduction is known to produce flakes with bipolar attributes (Cotterell and Kamminga 1987; Ahler 1989). While initiation types are not the exclusive product of any specific reduction technique there is a general trend for each of these initiation types to be produced more frequently during different types of reduction. Therefore, a higher frequency of cone initiations is considered to be representative of hard hammer core reduction, while a higher frequency of bend initiations is considered to be representative of tool production, and a higher frequency of wedge initiated flakes is considered indicative of bipolar reduction.

The presence of cortex is not an infallible measure of core reduction, given that initial preparation of cores involving the removal of cortex frequently occurs at a separate location, with the consequence that core reduction activities can occur with little cortex present in the debitage. However, in combination with initiation type frequencies, this measure can be instructive on whether or not cores were prepared before being transported to a site.

FLAKE CULLING ANALYSIS

Prentiss (1993) established that different reduction strategies produce distinctive patterns in debitage when examined for flake size and completeness. However, since the goal of core reduction is to produce flakes suitable for use as tools, archaeological debitage assemblages have inevitably undergone some degree of behaviorally significant alteration, slightly skewing the flake size and completeness distribution. This process of selective removal of flakes from an assemblage is referred to as flake culling and has been shown to leave distinctive patterning in assemblages produced through a variety of

different reduction strategies, since those strategies themselves produce distinctive patterning (Prentiss 1993).

Prentiss (1993) created a series of indices (see Appendix A) with experimental data examining the effects of flake culling behaviors on flake size and completeness distributions in assemblages created through a variety of reduction techniques. First, a baseline MSRT distribution was established with experimental reduction data for each of the reduction techniques. Those data were then rescaled, with the highest frequency flake category scored as 100 and each of the remaining flake categories rescaled proportionately. This was done to facilitate comparison between assemblages of different sizes and to anticipate proportional representations of flakes in archaeological assemblages when coded for size and completeness.

The next step was to evaluate these assemblages for proportions of flakes suitable for use as tools. Two flake characteristics are relevant to selection for use as tools and include size and edge angle (Prentiss 1993). Flake size is a proxy measure of usable edge length, since the larger a flake is the more edge it possesses, while edge angle is a major determinant of the suitability of a flake for a specific task. The steeper or higher an edge angle the more suitable the flake is for heavy duty tasks such as woodworking, while the more acute an edge angle the more suitable a flake is for lighter duty activities such as slicing or cutting meat, hide, or plant fibers. Flake size, or FVI for flake volume index, represents the proportion of useable flakes in the assemblage when the culling criteria is size alone. AAEL (Acute Angle Edge Length) is the proportion of usable flakes in an assemblage when selection criteria is length of an edge with an acute angle (less than 45°). HAEL (High Angle Edge Length) represents the proportion of usable flakes in an

assemblage when the selection criteria is length of an edge with a high angle (greater than 45°).

Since flakes are not chosen on the basis of a single attribute, edge angle and flake size are combined to create a new set of indices. FVixAAEL gives the proportion of usable flakes in an assemblage when the selection criteria are larger flakes with acute edge angles. Similarly, FVixHAEL represents the proportion of usable flakes when the selection criteria are larger flakes with more robust edge angles. Data for each of these combinations is first calculated using raw counts and then rescaled to represent proportional representation each flake class in the distribution given the selection criteria.

All of these indices measure potential usable flakes in an unculted assemblage, leaving us with the problem of how to interpret archaeological assemblages which have most likely been culled for some set of usable flakes. The residual indices of Prentiss (1993; Appendix A) address this issue. These indices were constructed by subtracting the rescaled utility indices from 100, thereby creating an exact inverse of the utility indices and reflecting the removal of specific flake classes from the assemblage. Multiplied by the original rescaled MSRT data results in the residual index which approximates the MSRT distribution in an assemblage which has been culled for specific flake types.

Taking these indices one step further, Prentiss (1993) modeled the effects of trampling, a significant source of modification in debitage assemblages in winter housepits, on culled assemblages. This was accomplished by trampling the experimental assemblages, coding the resulting flakes for size and completeness, and then assessing proportions of usable flakes based on the selection criteria discussed above. Raw counts were rescaled to represent proportional contributions of each flake class, and then

residual trampled indices were constructed following the same method as that described above for flake culling residual indices. Appendix A contains an example set of indices to demonstrate the logic and steps behind their construction.

These indices are used as a baseline for understanding the effects of reduction and culling behavior in the Subhousepit 3 assemblage.

EXPEDIENT AND CURATED TECHNOLOGIES

One of the most informative aspects of any lithic technology is the amount of time invested in the production and maintenance of tools. Two basic strategies of investment in tool production have been identified, expedient tools and curated tools (Binford 1979). Expedient tools are those tools that are produced and used in response to immediate needs, that undergo little modification prior to use, and that are discarded upon completion of the task at hand. In contrast, formal or curated tools undergo a significant degree of modification and intentional shaping prior to use, are prepared in anticipation of future needs, and frequently exhibit a high degree of resharpening and maintenance prior to being discarded. These two different organizational strategies have important implications for the archaeological record. The most obvious, and in many ways the most important, of these implications regards the area of discard. Expedient tools are produced, used, and discarded at the site of use, whereas curated tools are produced at one location but then are used and maintained in the tool kit for extended periods of time before being discarded in a different location and context. Additionally, strong correlations have been shown to exist between the amount of time and energy invested in tool production and maintenance and mobility strategies (Parry and Kelly 1987) where curated technologies are most frequently employed by mobile groups and more sedentary

groups tend to rely more upon expedient tools. For these reasons, tools from the Subhousepit 3 assemblage are classified as expedient or curated. This will help to assess the mobility strategies associated with the Subhousepit 3 occupation, whether it was a long term or a short term occupation.

TASK SUITABILITY

A second method for classifying tool function looks at tool suitability for general tasks. Three general categories are employed: hunting and butchery, hide working and basketry (light duty), and woodworking (heavy duty), as defined by Hayden et al (2000). The strength of this approach lies in its ability to give more detailed assessment of tool function and hence, range of activities that occurred in SHP3, again allowing for insight into the nature of this structure. A broad range of activities represented by the tools suggests a domestic structure where as a few activities suggests a special purpose structure. The third and final approach to understanding tool function is discussed in the following section.

USE WEAR ANALYSIS

The application of use wear analysis to the tools from Subhousepit 3 will serve as an independent test of the tool classification systems described above. In those studies, tools were assigned a general functional category based on assumed and inferred functions. The use wear data will test the validity of those assumptions in addition to providing some insight into the types of activities that occurred within Subhousepit 3.

The most significant debate surrounding use wear analysis concerns the use of high powered resolution (Keeley 1980) versus low powered resolution (Odell and Odell-Vereecken 1980) for the examination of residues and polishes along flake and tool edges.

High powered microscopic analysis has the advantage of being able to identify distinctive residues and polishes created by specific materials (i.e. grass versus tuber) that low powered resolution is incapable of detecting. Low-powered microscopic analysis are useful for gauging the general hardness of the materials being worked based on patterned differences in damage scars. Hard materials like antler or bone leave different wear patterns than softer woods and fibers, which in turn leave damage distinctive from yet softer materials such as hide or meat (Keeley 1980; Odell and Odell-Vereecken 1980). Odell and Odell-Vereecken (1980) have criticized high-powered analyses as being expensive, time consuming, and potentially lacking replicability between raw material types. On the other hand, Keeley (1980) sees at least two drawbacks to low-powered analyses. First, with low powered resolution it can often be difficult to distinguish between intentional retouch, damage which occurs during manufacture, and damage which occurs by site formation processes. Second, he believes that the scarring observable at low powered resolution is heavily influenced by edge angle. However, Odell and Odell-Vereecken (1980) have shown that the distinctive types of damage that occur at levels detectable by low power are more likely to be consistent between raw material types, making this approach more broadly applicable. They do acknowledge limitations in the types of information recoverable through low-powered techniques. For instance, it may be difficult to distinguish between a cutting, slicing, or sawing motions on materials of any hardness. To this they answer that “the techniques employed should be equal to the questions that they are required to answer, and if those questions dictate distinguishing cutting from sawing, for example, then low-powered methods are probably not suitable”. In most instances, it is relatively unimportant if the tool was used to cut or

to slice. What is important is determining if a tool was used as a scraper or used in some form of cutting activity that can be associated with a material of a certain hardness. It is for all of the above reasons that the low powered approach is felt to be most suitable to this analysis. The goal is primarily to assess the range of activity types which occurred within SHP3 as a means towards determining if this structure was domestic in nature or if it served some other function.

An American Optical 45RT Series 40 microscope with 7X to 30X zoom and two built in illuminators for reflected and transmitted light and a transparent stage plate was used to assess use damage on the tools recovered from Subhousepit 3. The number of employable units (EU) (Knudson 1983), or the number of utilized areas, was assessed for each tool. It was not uncommon for a single tool to have multiple EUs, some of which served different purposes.

SUMMARY

These analytical methods provide a range of information regarding technological organization that will be useful in addressing the function of Subhousepit 3 within the settlement and subsistence practices of the Late Plateau Horizon. The use of minimum analytical nodule analysis provides control over the differential use of lithic materials and sets the stage for later analyses. Use of the Modified Sullivan and Rosen Typology with debitage data allows for inferences on the form of raw materials when they were brought into the house as well as on reduction techniques. The alternate debitage analyses, flake initiation types and cortex presence, allow for an independent test of the MSRT. The flake culling analysis is useful in identifying post-depositional effects on the debitage assemblage and when combined with the trampling analysis, provides a strong indicator

of length of occupation. Tools are examined in several ways. First, tools are assessed for expedient versus curated designs. This is an important analysis for assessing length of occupation. Second, tools are assessed for task suitability and placed into one of three general categories. This analysis is useful in determining the range of activities that occurred within the house and by extension whether it is reflective of a long term domestic occupation, a short term domestic occupation, or a special activity structure. Finally, use wear is examined as an independent test of the task suitability assessment.

CHAPTER 3 RESULTS

In this chapter, the methods outlined in Chapter 3 are applied to the artifacts from Subhousepit 3. The results presented in this chapter set the stage for Chapters 4 and 5, in which interpretations of SHP3 and its role in the larger settlement and subsistence system of the Late Plateau Horizon at the Keatley Creek village are discussed.

APPLICATION OF MINIMUM ANALYTICAL NODULE ANALYSIS

A total of 353 flakes representing ten different raw materials was recovered from the floor deposits of Subhousepit 3 (Figure 3-1). Dacite is by far the most abundant lithic material, constituting 72% of the assemblage. Jasper follows distantly at 16%. Pisolite and quartzite each contribute 4% to the total, while chalcedony, vitric tuff, coarse basalt, nephrite, rhyolite, and green extrusive each represent 1% or less of the assemblage. Following the guidelines established for application of a coarse level of minimum analytical nodule analysis presented in the previous chapter, each of these lithic material types represents a separate analytical nodule. However, dacite and jasper are the only two materials that occur in high enough frequencies to permit separate consideration in most analyses. Lumping the remaining raw materials into a single analytical nodule was decided against, on the grounds that patterning in the debitage would be unreliable since there is no way to prove that all these materials were used or reduced in the same fashion. Additionally, it is felt that lumping these remaining materials into a single analytical unit would obscure their most significant and informative characteristic, their remarkably low frequencies. Nephrite is the only material present in the SHP3 assemblage which is excluded from most of the analyses to follow on the grounds that nephrite does not fracture conchoidally, like other tool stone. While nephrite celts can be initially shaped

using hard hammer percussion, the flakes detached tend to be highly unpredictable and wasteful of material (Darwent 1998). Since the debitage analysis used in this thesis is based on patterning in debitage produced through flint knapping materials with conchoidal fracture patterns, the nephrite flakes cannot be examined in the same way as they represent a distinctly different production strategy. The nephrite flakes present in this assemblage may have been produced during the initial shaping of an adze blank or they may represent pieces knocked off of a nephrite tool during use.

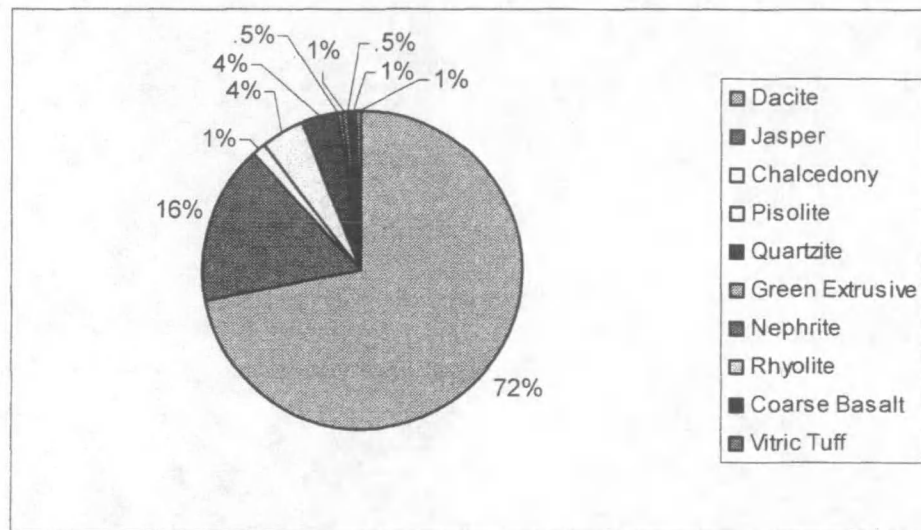


Figure 3-1. Subhousepit 3 debitage assemblage composition by lithic material.

APPLICATION OF THE MODIFIED SULLIVAN AND ROSEN TYPOLOGY

The Modified Sullivan and Rosen Typology (MSRT) requires relatively large samples in order to be truly reliable. For this reason, dacite and jasper are the only two materials to which this analysis could be effectively applied. Controlled experimental data produced by Prentiss (1998) demonstrates the distinctive patterns observable in debitage assemblages created by different reduction techniques when examined using the MSRT (Table 3-1). Raw count data were converted to proportions in order to facilitate comparison between assemblages of different sizes. A close examination of this table

shows that the small sized debitage ($<4 \text{ cm}^2$) is the size class most sensitive to reduction technique, due primarily to sample size. Specifically, however, small proximal fragments are the most sensitive indicator and when used in conjunction with other small MSRT categories very distinctive patterns emerge which distinguish the different reduction types (Table 3-1). For instance, all forms of core reduction produce slightly elevated numbers of nonorientable fragments in comparison to biface reduction. Soft hammer unprepared core reduction produces significantly higher numbers of small split flakes than any other form of lithic reduction. Hard hammer prepared core reduction and hard and soft hammer biface reduction produce high numbers of small proximal fragments. However, hard hammer biface reduction assemblages contain very high numbers of small complete flakes in conjunction with the high numbers of small proximal flakes. Soft hammer biface reduction assemblages are distinguished by extremely low numbers of nonorientable fragments associated with high numbers of small proximal fragments and low numbers of small complete flakes. Hard hammer prepared core assemblages are distinguished by high numbers of small proximal fragments and the presence of nonorientable fragments. These patterns are very distinct and exhibit very little overlap. These data are used as a baseline for comparison with the dacite and jasper MSRT distributions. Once the reduction strategies have been ascertained, the SHP3 data will be compared to the flake culling and trampling indices (Prentiss 1993) in order to evaluate postdepositional influences on the assemblage.

The dacite debitage assemblage is characterized by an extremely high frequency of small proximal fragments, elevated small medial-distal fragments, the presence of small nonorientable fragments, and low numbers of small split flakes (Table

Table 3-1 MSRT Distributions by Reduction Technique in Raw Count and Proportion.

	HH UPC 5		SH UPC 6		HH PC 7		SH PC 8		HH BF 12		SH BF 13	
	Freq	Prop	Freq	Prop	Freq	Prop	Freq	Prop	Freq	Prop	Freq	Prop
Medium												
CF	0	0	0	0	1	0.01	1	0.01	7	0.09	3	0.04
PF	1	0.01	3	0.02	3	0.01	7	0.04	2	0.03	1	0.01
MDF	12	0.1	22	0.16	18	0.09	22	0.13	5	0.07	6	0.09
NF	1	0.01	1	0.01	0	0	1	0.01	0	0	0	0
SF	2	0.02	3	0.02	7	0.03	2	0.01	0	0	0	0
Small												
CF	2	0.02	0	0	10	0.05	3	0.02	12	.16*	3	0.04
PF	3	0.03	3	0.02	28	.13*	12	0.07	10	.13*	10	.15*
MDF	56	0.49	63	0.45	103	0.49	77	0.47	33	0.44	39	0.57
NF	7	0.06	8	0.06	13	0.06	14	0.09	1	0.01	0	0
SF	3	0.03	16	0.11*	7	0.03	10	0.06	4	0.05	6	0.09

HH = Hard Hammer, SH = Soft Hammer, UPC = Unprepared Core, PC = Prepared Core, BF = Biface, CF = Complete Flake, PF = Proximal Fragment, MDF = Medial/distal Fragment, NF = Nonorientable Fragment, SF = Split Flake, Prop = Proportion Data (from Prentiss, 1998).

**Table 3-2. Subhousepit 3 MSRT
Distributions by Raw Count and
Proportion.**

	VT		Jasper	
	Freq	Prop	Freq	Prop
Medium				
CF	0	0	0	0
PF	2	0.01	0	0
MDF	3	0.01	3	0.05
NF	0	0	0	0
SF	0	0	0	0
Small				
CF	14	0.06	0	0
PF	43	.17*	5	.09*
MDF	175	0.71	42	0.76
NF	8	.03*	4	.07*
SF	2	0.01	1	0.02

3-2). When compared to the experimental data in Table 3-1, the data strongly correspond to hard hammer prepared core reduction. The only other reduction strategy that this assemblage comes close to approximating is soft hammer biface production. However, this can be ruled out as the dominant reduction strategy employed by the inhabitants of SHP3 for several reasons. First, soft hammer biface reduction produces no non-orientable fragments and this flake type is present in the SHP3 assemblage. Secondly, soft hammer biface reduction produces high frequencies of split flakes and split flakes are all but absent from the SHP3 assemblage. While other reduction strategies may have been employed in SHP3, they would have contributed significantly less to the assemblage.

The jasper assemblage is characterized by high numbers of small proximal fragments with associated elevated small medial-distal fragments, high frequencies of small nonorientable fragments, and very low numbers of small split flakes (Table 3-2). As with dacite, the jasper data conform strongly to the pattern of hard hammer prepared core reduction.

ALTERNATE DEBITAGE ANALYSIS: Flake Initiation Type Frequencies

Flake initiation type frequency is examined as a means of verifying the results gained from the MSRT analysis. Again, due to sample size constraints, only dacite and jasper are examined. Three types of initiations are possible; cone, bend, and wedge (Cotterell and Kamminga 1987). While there is no one to one relationship between initiation type and reduction technique, general trends do exist. Cone initiations are most frequently produced with hard percussors and bend initiations with soft percussors. Pressure flaking can produce either of these types of initiations depending on the

technique used (Cotterell and Kamminga 1987). Based on the results of the MSRT analysis, both dacite and jasper were used primarily in hard hammer prepared block core reduction. If this is the case, then both of these raw material types should be represented by elevated frequencies of cone initiated flakes. In contrast, higher frequencies of bend initiations would indicate more of an emphasis on soft hammer reduction or formal biface production than was detected in the MSRT analysis, and high frequencies of wedge initiations would indicate a heavier reliance on bipolar reduction. In the larger picture, this means that if SHP3 conforms to the winter village pattern and represents a long term cold season occupation then wedge initiated flakes should be present, cone initiations should be dominant, and bend initiations should occur in much lower frequencies. A shorter term occupation might be expected to exhibit little to no bipolar reduction since higher residential mobility would bring people into contact with lithic material sources more frequently, thereby reducing the need for exhaustive use of materials on hand. Additionally, a shorter term occupation associated with higher residential mobility might be reflected in higher frequencies of bend initiations, reflective of a focus on formal tool production and maintenance.

Fifty-nine dacite flakes had identifiable initiation types. Of these 59 flakes, 46 have cone initiations and 13 have bend initiations. No wedge initiations were identified. This distribution, which is heavily dominated by cone initiations, is strongly suggestive of hard hammer reduction. The presence of the bend initiations can be understood in several ways. First, it is possible for hard hammer reduction to occasionally produce bend initiations, and second, some soft hammer percussion may have been employed, either in core reduction or small amounts of formal tool production that was not

discernable in the MSRT analysis. It is probable that both factors contributed to the assemblage. Overall, initiation types strongly support the results of the MSRT analysis.

Only seven jasper flakes had identifiable initiation types. Four of these are cone initiations and three are bend initiations. Reliable interpretations cannot be made from a sample size this small.

ALTERNATE DEBITAGE ANALYSES: Cortex Evaluation

Cortex coverage is a poor indicator of core reduction versus tool production. However, it can be a very useful tool for gauging the significance of decortication activities at a site (Mauldin and Amick 1989). An assemblage which was created by early stage reduction should be marked by much higher frequencies of dorsal cortex coverage than one created primarily by later stage reduction. Both the MSRT analysis and initiation type frequencies suggest that core reduction was a major contributing reduction behavior to the SHP3 assemblage. The percentage of cortical flakes present in the SHP3 assemblage will be informative on whether decortication occurred at the winter house or at the lithic material access location. For the purposes of this study, cortex was measured as primary (75-100% dorsal cortex coverage), secondary (1-74% dorsal cortex coverage), or tertiary (0% dorsal cortex coverage).

Three dacite flakes out of 254 have secondary cortex coverage. No dacite flakes with primary cortex coverage were recovered. Similarly, three jasper flakes were recovered bearing secondary cortex coverage. Again, no flakes with primary coverage were present. This strongly suggests that decortication of the cores was occurring away from the house.

One pisolite flake with secondary dorsal cortex coverage was present, but no cortex was recorded on flakes made from any of the remaining materials. It is clear then that the flakes made from these raw materials were made later during the reduction process.

Based on this data, it appears that decortication occurred primarily in locations away from the winter residence. Cores were transported and stockpiled in winter houses in primarily reduced forms.

FLAKE CULLING ANALYSIS

Flake culling analysis was designed (Prentiss 1993) to gauge the significance of the selective removal of flakes from a debitage assemblage for use as tools. Different flake attributes are desirable for different types of activities. Therefore, behaviorally significant patterns should emerge in a debitage assemblage if flakes are selectively removed for specific useful traits. Controlled experimental data produced by Prentiss (1993) is used as a framework for interpreting the effects of flake culling on the debitage assemblage from SHP3.

The debitage assemblage from SHP3 is strongly weighted towards flakes in the small size category. There are several possibilities which could explain the disproportionate representation of small flakes from this core reduction assemblage. First, sweeping and other cleanup activities are known to have occurred in housepits throughout their occupation. Sweeping will have a tendency to remove the larger flakes while leaving smaller-sized flakes in place. Second, this pattern could have resulted from selective culling of flakes for specific attributes. Removal of this nature is focused on a specific attribute or set of attributes, creating a recognizable pattern in the residual

debitage assemblage. This section reviews several models for patterning created by flake culling based on Flake Volume Index (FVI) or flake size, Acute Angle Edge Length (AAEL), and High Angle Edge Length (HAEL), and combinations thereof. Experimental models created by Prentiss (1993) are used as a frame of reference for recognizing assemblages culled for different flake types.

Medium flake goal prepared block core reduction flake culling models were chosen as the basis of comparison for this analysis based on the results of the MSRT analysis. Medium flake size goal was chosen because of the paucity of medium sized flakes in the assemblage and the high breakage rates in the small flake size category. If the goal was to produce medium sized flakes for expedient use, then few of these should be recovered. If the flake size goal had been large or extra-large then more medium and large sized flakes should have been recovered.

Selection of flakes based on size (FVI) alone creates an assemblage heavily dominated by the small flake size categories, since the larger flakes are more likely to be chosen for use. While thedebitage from SHP3 is heavily dominated by the small flake size categories, other forms of flake culling can also be responsible for this or very similar patterns. Selective culling of flakes for acute edge angles removes medium complete flakes, proximal fragments and split flakes, as well as some small complete and split flakes. Conversely, selectively culling for flakes with high edge angles removes medium medial/distal, nonorientable, and proximal fragments, as well as some small medial/distal and proximal flakes. When these distributions are compared against the data from SHP3 (Figure 3-2) it becomes apparent that these simple models for flake removal are insufficient to explain the patterning in SHP3 data. Differences exist in all of

the medium flake size categories as well as in the small proximal, medial/distal, and split flake categories. When trampled, these same culling behaviors show greater similarities to the SHP3 data, however differences remain in the medium flake size categories and in the small proximal fragments (Figure 3-3). Measuring along a single dimension of variability masks more complex behavior. Therefore, a more realistic approach is to examine assemblages culled for either low edge angles (AAEL) or high edge angles (HAEL) along with flake size.

Models for flake culling that incorporate size and acute edge angle (FVI x AAEL) show reduced numbers of flakes primarily in the larger size categories. The focus in this type of culling is on medium complete flakes and proximal fragments, while flake culling based on a combination of size and high edge angle (FVI x HAE) focuses on medium medial/distal flakes and some medium proximal flakes. This latter form of flake culling differs significantly from the SHP3 data in the medium complete and proximal flake categories and in the small proximal and split flake categories, having significantly higher proportions of all of these flake categories than the SHP3 data (Figure 3-4). Models combining flake size and acute edge angle differ mostly in the small proximal and split flake categories, also having higher proportions of these flakes than SHP3 (Figure 3-4). Other more minor differences exist in the medium complete and medial/distal categories. The addition of a second dimension of variability has helped to more closely identify the patterning in the SHP3 data.

When the effects of trampling are added into the analysis many of these differences are noticeably diminished. Medium complete and split flakes and small

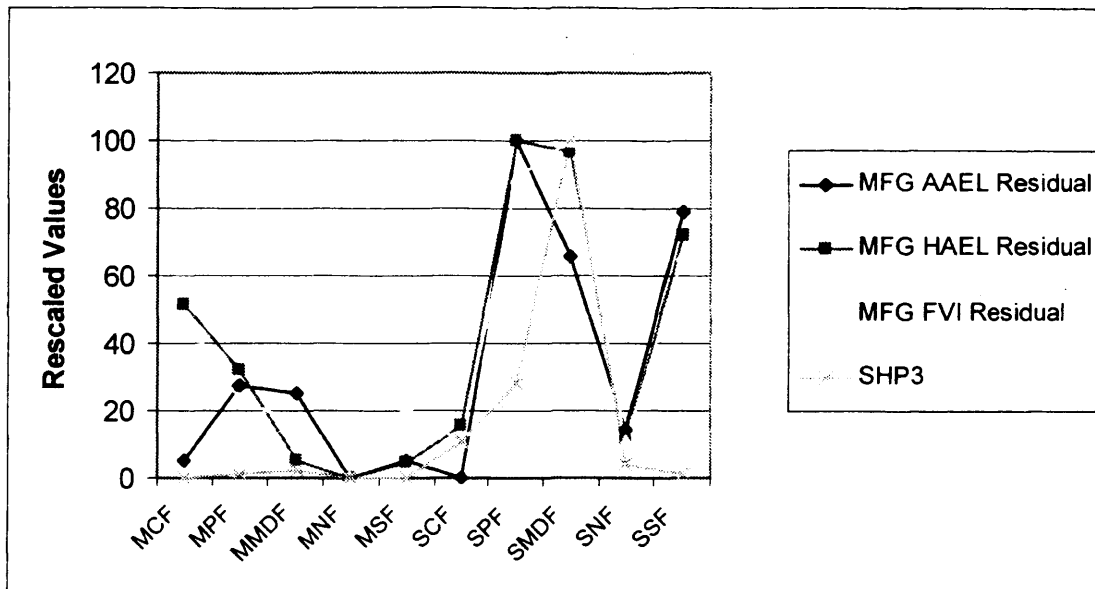


Figure 3-2*. SHP3 dacite MSRT distribution compared to experimental data showing MSRT distributions for assemblages culled for large flakes (FVI), for flakes with acute angled edges (AAEL), and for flakes with high edge angles (HAEL).

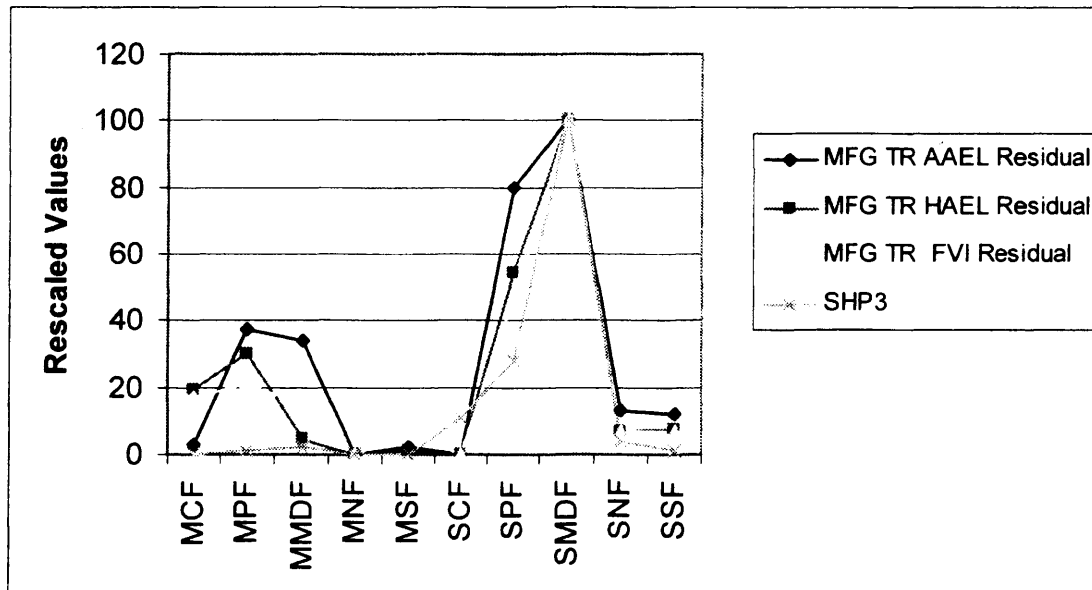


Figure 3-3*. SHP3 dacite MSRT distribution compared to experimental data showing trampled MSRT distributions for assemblages culled for large flakes (FVI), flakes with acute angled edges (AAEL), and flakes with high edge angles (HAEL).

*FVI=Flake Volume Index. AAEL=Acute Angle Edge Length. HAEL=High Angle Edge Length. MCF=Medium Complete Flake. MPF=Medium Proximal Fragment. MMDF=Medium Medial-Distal Fragment. MNF= Medium Non-orientable fragment. MSF=Medium Split Flake. SCF=Small Complete Flake. SPF=Small Proximal Fragment. SMDF=Small Medial-Distal Fragment. SNF= Small Non-orientable fragment. SSF=Small Split Flake. MFG=Medium Flake Goal. SHP3=Subhousepit 3.

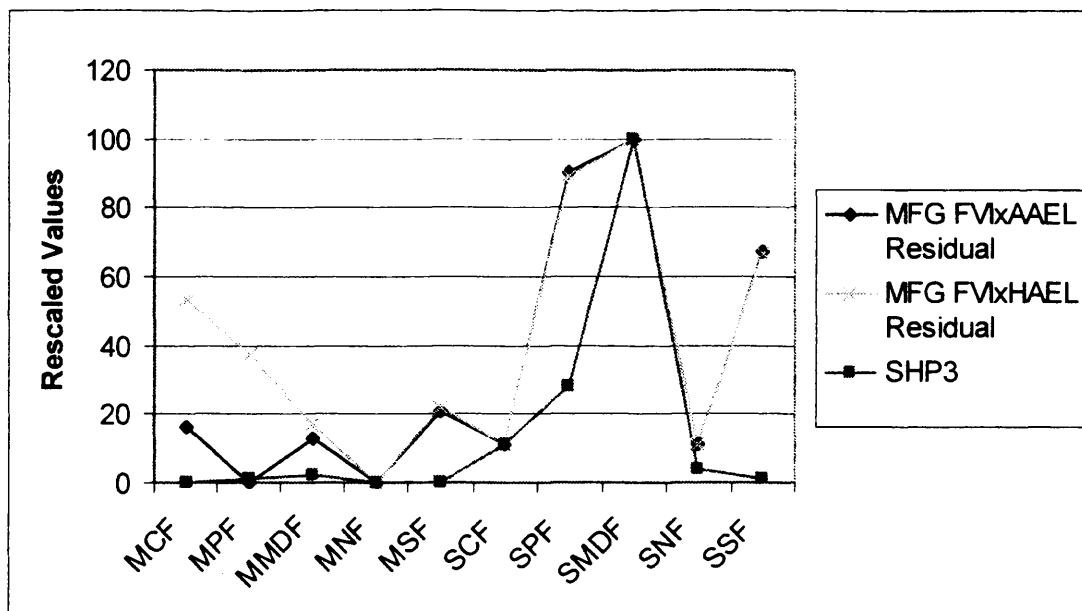


Figure 3-4* SHP3 dacite MSRT distribution compared to experimental data showing MSRT distributions for assemblages culled for flakes with long acute angled edges (FVIxAAEL) and long high edge angles (FVIxHAEL).

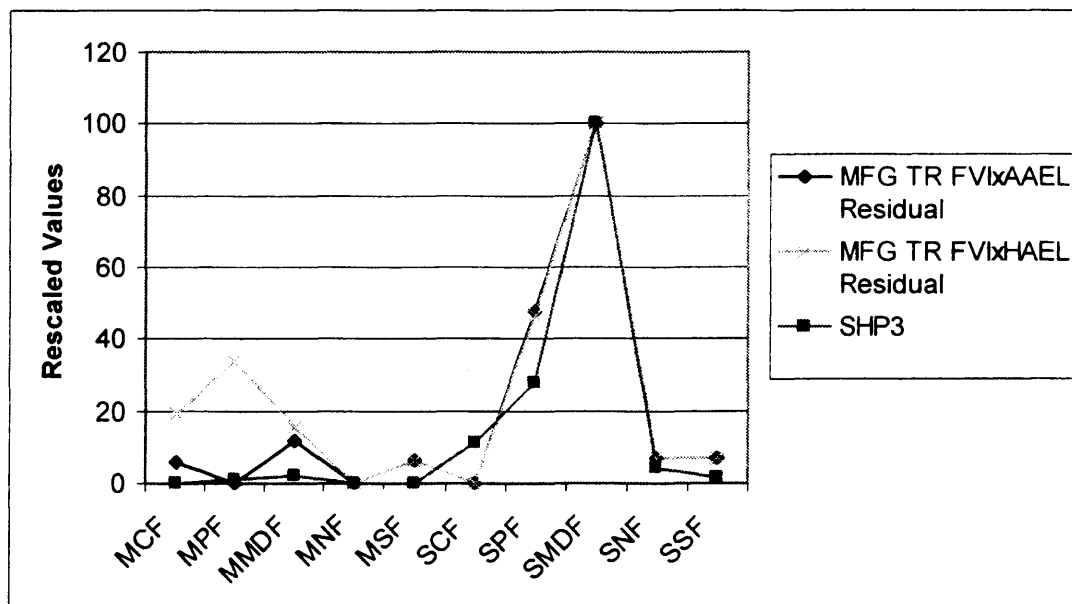


Figure 3-5* SHP3 dacite MSRT distribution compared to experimental data showing trampled MSRT distributions for assemblages culled for flakes with long acute angled edges (FVIxAAEL) and long high edge angles (FVIxHAEL).

*FVI=Flake Volume Index. AAEL=Acute Angle Edge Length. HAEL=High Angle Edge Length. MCF=Medium Complete Flake. MPF=Medium Proximal Fragment. MMDF=Medium Medial-Distal Fragment. MNF= Medium Non-orientable fragment. MSF=Medium Split Flake. SCF=Small Complete Flake. SPF=Small Proximal Fragment. SMDF=Small Medial-Distal Fragment. SNF= Small Non-orientable fragment. SSF=Small Split Flake. MFG=Medium Flake Goal. SHP3=Subhousepit 3.

proximal and split flakes are significantly reduced in both FVIXAAEL and FVIXHAEL distributions which have had flakes based on these attributes selectively removed (referred to as the residual distribution). The FVIXHAEL distribution retains a significantly higher numbers of medium proximal flakes. The data from SHP3 very closely matches model data for medium flake goal trampled assemblages culled for flakes on the basis of acute edge angle length and flake size (Figure 3-5). The strong patterning in the data preclude the possibility that sweeping or other cleanup activities played a significant role in the formation of the SHP3 assemblage. Some of the differences between the trampled FVIXAAEL data may be attributed to secondary culling for FVIXHAEL flakes.

Patterning in the jasper data follow exactly the same pattern as that described for the dacite (Figures 3-6 and 3-7). Both raw materials are being brought into the site as primarily reduced cores which are then used to produce medium sized flakes with acute edge angles. The debitage has undergone some degree of trampling.

The sample sizes of the remaining eight analytical nodules precludes the use of this type of analysis. Too few flakes are represented to facilitate pattern recognition.

TOOL EXPEDIENCY AND CURATION

A total of 21 tools was recovered from SHP3, eighteen of which are made from dacite. Twelve of these tools are expedient flake tools, 4 are formally shaped curated tools, and 5 are artifacts associated with lithic reduction (Table 3-3). Following Spafford (1991), the expedient flake tools can be broken into two categories, general purpose and special purpose expedient flake tools. Eight of these expedient flake tools can be classified as general purpose tools, seven scrapers and one utilized flake, while the

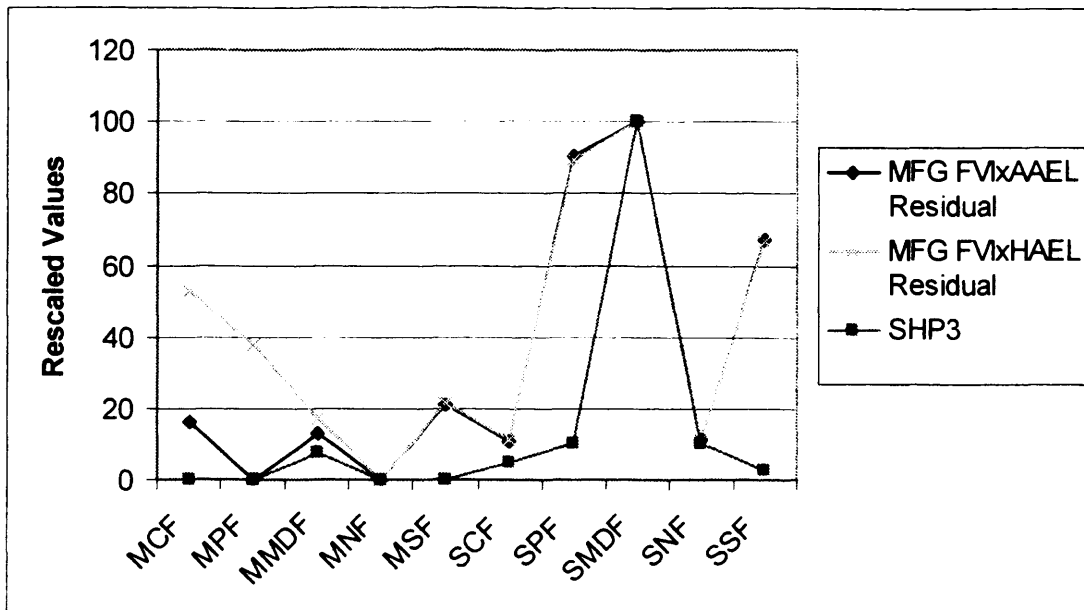


Figure 3-6* SHP3 jasper MSRT distributions compared to experimental assemblages culled for flakes with long acute angled edges (FVIxAAEL) and long high edge angles (FVIxHAEL).

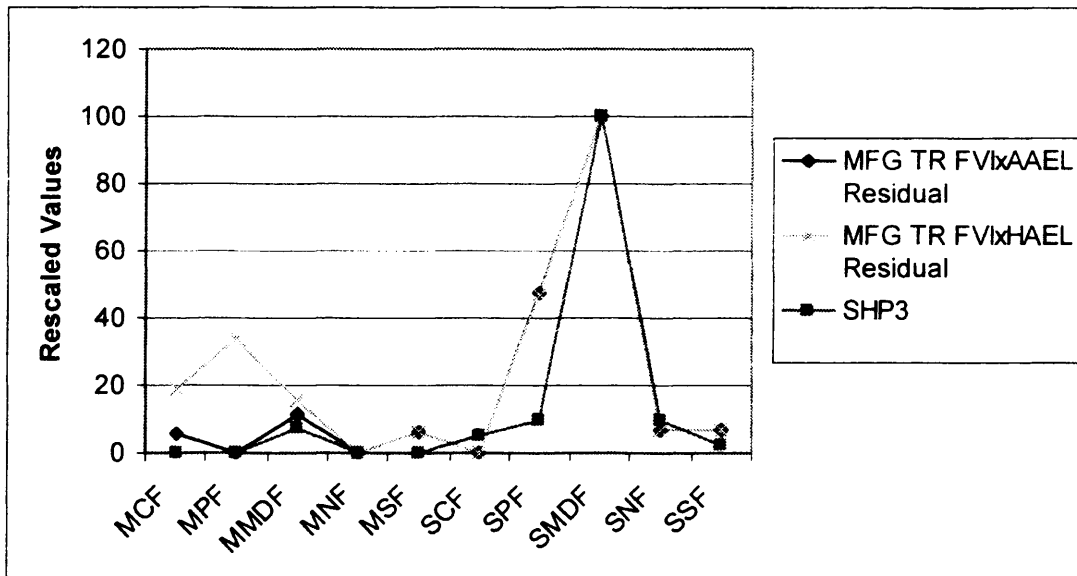


Figure 3-7* SHP3 jasper MSRT distributions compared to trampled experimental assemblages culled from flakes with long acute angled edges (FVIxAAEL) and long high edge angles (FVIxHAEL).

*FVI=Flake Volume Index, AAEL=Acute Angle Edge Length, HAEL=High Angle Edge Length. MCF=Medium Complete Flake, MPF=Medium Proximal Fragment, MMDF=Medium Medial-Distal Fragment, MNF= Medium Non-orientable fragment, MSF=Medium Split Flake, SCF=Small Complete Flake, SPF=Small Proximal Fragment, SMDF=Small Medial-Distal Fragment, SNF= Small Non-orientable fragment, SSF=Small Split Flake, MFG=Medium Flake Goal, SHP3=Subhousepit 3.

remaining four are classified as special purpose tools and include a piercer, a borer, a notch, and a piece esquillee. All of the working edges on these tools show only minor modification and represent flakes chosen for use on the basis of suitable morphological characteristics rather than flakes intentionally shaped to produce a specific tool type.

In contrast, four tools are formally shaped curated tools and include a Shuswap projectile point, a knife-like biface, an end scraper, and a ground nephrite fragment. The Shuswap projectile point has a broken tip but attempts were made to resharpen it, and thus extend the use life of the tool. The knife-like biface exhibits bifacial retouch along one margin with a more rounded opposite edge. The bifacial flaking of this tool coupled with retouch along the working margin indicates a tool with a fair amount of time investment which was resharpened in order to extend its use life beyond one or two uses. The end scraper is a specific formalized tool type designed for working hides (Hayden et al 2000). Despite the relatively low time investment in shaping an end scraper, these tools were frequently hafted, significantly increasing the investment in the production of the tool. Once hafted, it is more economical to resharpen the existing scraper than to make and haft a new one. While these tools may or may not have been part of the mobile tool kit, they could have been site furniture at winter villages, where most hide working occurred. For these reasons, end scrapers are considered curated items. Finally, the ground nephrite fragment, while not a tool in and of itself, is considered to reflect the creation of a tool or ornamental object which involved a substantial time and energy investment to create. Experimental studies (Darwent 1998) using ethnographically recorded nephrite production techniques, have demonstrated that an hour of sawing results in a groove in the nephrite object of 1.5 mm on average. In order to produce a

Table 3-3 Tool Data Summary Table.

Tools by Category	Frequency	Functional Classification	Use Wear-Material Hardness
Expedient Flake Tools			
Piece Esquillee	1	Woodworking	Hard
Convergent Scraper	1	Woodworking	S-Med
Double Scraper	1	Woodworking	S-Med/M-Hard
Inverse Scraper	1	Woodworking	S-Med
Double Inverse Scraper	1	Woodworking	S-Med
Single Scraper	3	Woodworking	M-Hard/Inconclusive/N/A
Borer	1	Woodworking	N/A
Piercer	1	Hide Working/Basketry	N/A
Notch	1	Woodworking	M-Hard
Utilized Flake	1	Multiple Use	Inconclusive
Curated Tools			
Shuswap Point	1	Hunting/Butchery	N/A
Knife-like Biface	1	Hunting/Butchery	Soft
End Scraper	1	Hide Working/Basketry	Soft
Ground Nephrite Fragment	1	N/A	N/A
Lithic Reduction Artifacts			
Hammerstones	3	N/A	Battering
Small Flake Core	1	N/A	N/A
Bipolar Core	1	N/A	N/A

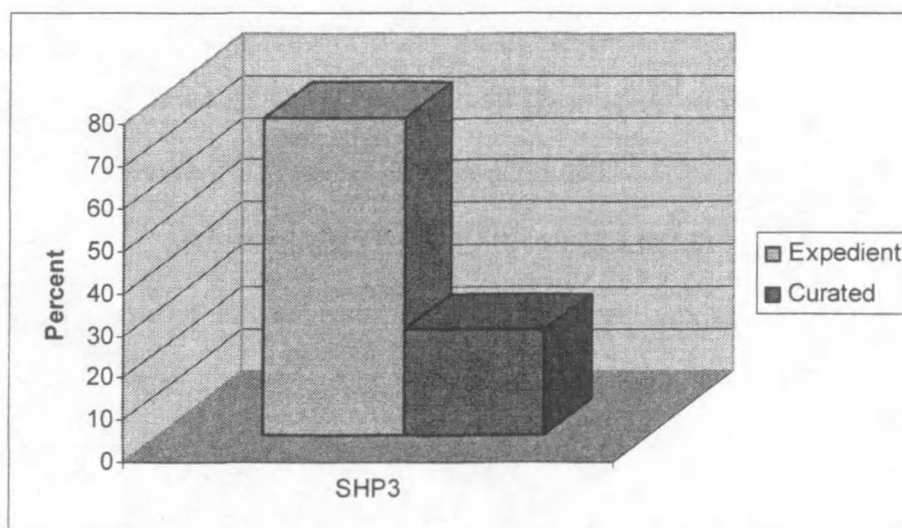


Figure 3-8. Subhousepit 3 lithic tool assemblage composition by expediency.

complete tool such as an adze, hundreds of hours must be expended in sawing and grinding and shaping. No matter what the object is that is being produced, nephrite cannot be an expedient tool because it is virtually impossible to solve immediate problems with it if it has not already been shaped. The time investment alone makes it extremely un-economical to casually discard nephrite objects.

The five remaining tools are artifacts associated with lithic reduction and include three hammerstones, one small flake core, and one bipolar core. These tools are not easily classified as either expedient or curated and therefore comprise a separate category. The presence of these artifacts reflects a fair degree of core reduction activities occurring within SHP3.

The SHP3 tool assemblage, excluding items associated with lithic reduction, is heavily dominated by expedient flake tools, which account for 75 percent of the assemblage (n=12), while extensively retouched tools account for only 25 percent (n=4) (Figure 3-8). This strongly suggests that the technological strategies associated with the occupation of SHP3 conformed to the winter village pattern, with a focus on expedient technologies for immediate needs coupled with gearing up activities for warm season mobility or logistical forays as winter weather permitted.

ASSESSMENT OF TASK SUITABILITY

The purpose of this analysis is to move beyond production, use, and discard strategies into more task specific data. While technological organization is not the main focus of this analysis, the results will contribute towards an understanding of the role SHP3 played in the larger settlement and subsistence system of the late Plateau Horizon.

Three general task oriented categories have been identified (Hayden et al. 2000): hunting and butchery, hide working and basketry (light duty), and woodworking (heavy duty). Lithic reduction tools are not considered in this analysis, therefore only 15 tools out of the 21 recovered from SHP3 are relevant to this analysis. Results are summarized in Figure 3-9 and Table 3-3.

Hunting and butchery activities are represented by two tools, the projectile point and the knife-like biface. The projectile point is classified as an eared Shuswap point. Defining characteristics of this point type include shallow corner notches, a concave basal margin, and pronounced basal-lateral “ears”. Richards and Rousseau (1987) suggest that this point type is not known to occur past 2800 BP, while SHP3 has been radiocarbon dated twice to 1700 BP, well into the late half of the succeeding Plateau Horizon. However, this point was found lying directly on the floor of Subhousepit 3 and appears to have been discarded by the inhabitants. If Richards and Rousseau (1987) are correct about this style of projectile point not occurring past 2800 BP, then the occurrence of one in Subhousepit 3 could reflect the scavenging of lithic materials discarded during previous occupations at the site by the inhabitants.

Hide working and basketry, both light duty activities, are also represented by only two tools, a piercer and an endscraper. The endscraper is a classic hide working tool, while the piercer was potentially suitable for a variety of activities. Most likely, however, the piercer is also related to hide working.

Heavy duty woodworking activities are disproportionately represented with 10 tools. All seven of the remaining scrapers from the assemblage are considered woodworking tools, the *pieces esquillee* is a wedge tool used in both antler and

woodworking, the unifacial borer is similar in function to the piercer used in hide working except that the tool itself is formed on a more robust angle, making it more suitable for use with harder materials such as wood or antler. The notch is useful in straightening segments of wood.

The single utilized flake recovered from the floor deposits of SHP3 cannot be assigned to any single functional category due to its suitability to a wide variety of tasks. However, Hayden et al. (2000) suggest that these tools were primarily used in the production of basketry, but without distinctive use wear patterns this has to remain conjecture and the utilized flake is assigned to a new multipurpose category.

An examination of this tool assemblage by functional classification reveals a strong emphasis on tools suitable for woodworking (67 percent of the assemblage). Hunting and butchery tools and hide working and basketry task specific tools (13 percent of the assemblage each) are present in low frequencies. The validity of this functional classification will be tested using use-wear data.

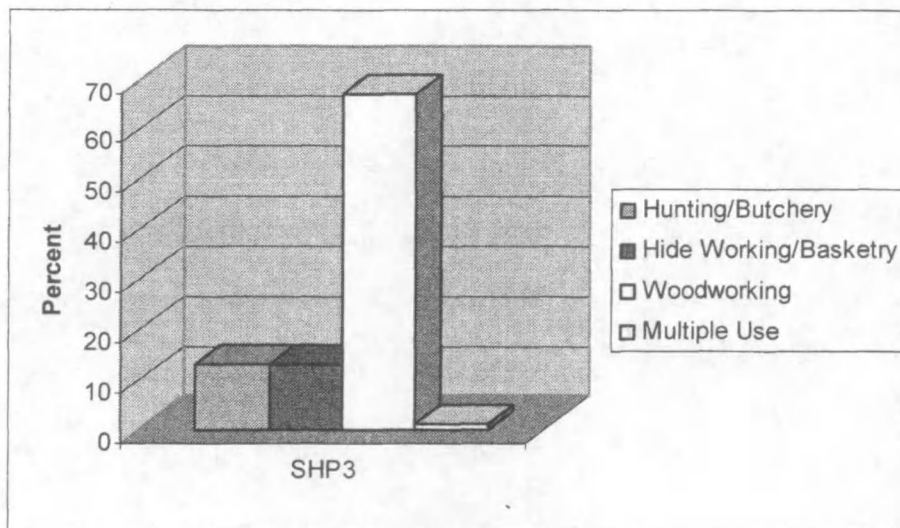


Figure 3-9. Subhousepit 3 lithic tool assemblage by functional classification.

USE-WEAR ANALYSIS

Low powered use-wear analysis can indicate the general hardness of the material being worked, therefore it was considered an appropriate test of the task suitability classification discussed above. Use-wear data are presented by tool and the hardness of the material worked in Table 3-3.

The knife-like biface has two used edges, referred to as employable units (EU) following Knudson (1983). EU1 has an edge angle of 33° and exhibits bifacial semi-invasive regular scalar retouch scars. Use wear is not evident, most likely due to the extensive retouch along this edge which would have removed or obscured use damage. EU2 has an edge angle of 52° and exhibits abrupt regular scalar retouch scars with slight rounding evident between retouch scars. Rounding is created through the working of two different materials, either soft materials such as hide, meat, or some plant materials or extremely hard materials such as antler. Rounding associated with the working of hard materials usually only occurs once enough damage has been done to the edge causing it to stabilize (Odell and Odell-Vereecken 1980). Given the knife-like shape of this biface it is most likely that this tool was employed in the working of soft materials rather than hard materials.

The Shuswap projectile point does not have visible use wear. This is at least due in part to attempts to resharpen the point, resulting in the removal of use wear scars which may have been present on the margins of the tool.

The piece esquillée is a classic wood working tool that functions as a wedge. The piece esquillée associated with SHP3 conforms to these expectations. There are two areas of use present on this tool. EU1 exhibits regular invasive scalar retouch while EU2

exhibits regular invasive utilization damage characterized by wedge initiated stepped and hinged terminations. Extensive crushing is evident along the opposite margin. Most wood available in the project area is coniferous, which is considered by Odell and Odell-Vereecken (1980) to be a soft-medium material. The use-damage itself is more consistent with that described for hard-medium materials than for soft-medium materials. However, a piece esquillee is used as a wedge and sustains damage in a bipolar manner, resulting in many wedge initiated fractures. The method of use in this particular case is considered to be the largest contributor to the type of use damage rather than material worked.

The end scraper has edge angles ranging from 47° to 75°. Retouch is extensive along 75% of the lateral margin and is characterized as abrupt, regular, and scalar. Use wear apparent on this tool is limited to extensive rounding of the ridges between retouch flake scars. The end scraper is a classic hide working tool and the use wear and retouch characterizing this end scraper is consistent with such an interpretation where the end scraper was rounded through use and was resharpened. The relatively steep edge angle associated with this end scraper would facilitate resharpening and possibly function as a safeguard against accidental puncturing or slicing the hide (Andrefsky 1998).

The convergent scraper has an edge angle of 70° and exhibits invasive, abrupt, scalar retouch scars along two converging edges. Over this retouch, very small scalar and step utilization scars are apparent. Small stepped scars are a common occurrence on steep edge angles (Keeley, 1980) and do not necessarily reflect hardness of the material being worked. However, small shallow scalar utilization scars are typically formed when working soft-medium materials as defined by Odell and Odell-Vereecken (1980).

Therefore, this type of utilization damage is consistent with scraping soft coniferous woods and some tougher plant fibers.

One double scraper was recovered from the floor deposits of SHP3. This double scraper has two modified edges. EU1 has an edge angle of 59° and shows normal, scalar, abrupt retouch scars and exhibits a small amount of crushing. EU2 is a scraping edge on a notch with an edge angle of 73°. Retouch scars on this edge are normal, scalar, and abrupt. The notch feature exhibits perpendicular striations. The retouch associated with EU1 has most likely removed any traces of use wear that were originally present. The striations of EU2 are indicative of a transverse motion, most likely scraping given the location is on the inside of a notch. Striations do not frequently form when the material worked is soft and when they do they tend to be faint. Likewise, hard materials create excessive utilization damage which carries away most polish and striations. Working hard-medium materials is commonly associated with striations. However, soft-medium materials are also associated with striations, though less frequently than hard-medium materials. The edge angles of both of these EU's suggests that they were most likely employed in the working of wood or some other tough fiber as a steep edge will retain its sharpness longer than an acute edge when working harder materials. Taken together the evidence strongly supports the interpretation of this double scraper being a wood or bone working tool.

The inverse scraper associated with SHP3 has an edge angle of 55°. Retouch scars along the used portion of this tool are classified as regular, inverse, and semi-abrupt. Overlying this retouch is rounding associated with use. The rounding exhibited on this tool edge is not consistent with that described for hide working polish. The

rounding occurs primarily on the high ridges between the retouch flake scars. Working of soft materials such as hide would not be so strictly limited to the ridges, but would form lightly inside the flake scars as well. Therefore, this rounding is most likely to have formed from working a soft-medium, hard-medium, or hard material, though Keeley (1980) identifies this as a result of planning wood. Given that planning can cause slightly more abrasion to the working edge than scraping, it is possible that the edge rounding exhibited by this tool is the result of planning wood, which would classify this use wear as consistent with working a soft-medium material.

One double inverse scraper was recovered from SHP3. This tool has one acute edge angle of 25° and one high angled edge of 72°. Retouch along the acute edge is semi-invasive and regular along the high angled edge. Use wear is evident only along the high angled edge and is classified as regular, scalar, and abrupt utilization scars with rounding on the ridges between the scars. Any use wear that was present along the acute edge has been removed by retouch. The use wear on the high angled edge is consistent with working of soft-medium material. The scalar scars are abrupt, where if the material worked was soft these scars should not be abrupt, but rather shallow. Hard-medium materials typically leave stepped or hinged terminations, not scalar scars with feather terminations. This is consistent with Keeley's (1980) determination that scraping wood tends to leave small deep scalar scars, as opposed to scraping bone which leaves large shallow scalar scars and small step scars. Sawing wood leaves half-moon scars. Therefore this tool is best interpreted as a wood scraper. The abrupt nature of the scars is consistent with the effect of a high edge angle which tends to create utilization scars which are not as invasive.

Three single scrapers were recovered from the floor deposits of associated with SHP3. The first one has an edge angle of 35° and exhibits semi-invasive, normal, scalar retouch with rounding and striations perpendicular to the working edge visible over the retouch scars. The lack of damage scars suggests two possibilities. First, a soft material could have been worked, leaving only damage scars visible with the aid of a microscope. Second, a very hard materials such as antler, bone, or dried hard wood could have been worked. Under these conditions striations and polish are usually removed by damage scars. However, if the tool is used long enough, the edge can stabilize resulting in the near cessation of damage scarring. Enough friction can be produced while working these hard materials to cause edge rounding (Odell and Odell-Vereecken, 1980). This latter is the most likely scenario despite the acute working edge angle, since hide working usually leaves a very distinct rounding on a tool edge which the rounding on this scraper does not match. Scraping or planing a hard material is the most likely activity associated with this type of use damage.

The second of the three single scrapers has an edge angle of 65° . Semi-invasive normal scalar and step retouch scars are visible along this working edge. Utilization damage on this edge includes unifacial crushing, some rounding (also unifacial), and perpendicular striations. Again, this use-wear is best interpreted as the result of scraping or planing a hard material such as bone or antler.

The third single scraper recovered from SHP3 has an edge angle ranging from 55° to 58° . Retouch is classified as abrupt, normal, scalar scars. The lateral margin of this scraper exhibits damage consistent with trampling. No use-wear is apparent on this tool.

In summary, the use wear associated with these tools reflects a strong bias towards wood working and the working of hard materials. Overall, there is a remarkable degree of concurrence between the use wear data and the inferred task suitability discussed in the previous section. In brief, of the 15 tools assessed, use-wear and functional classification concur in 9 tools, 4 lack use-wear data on which to test the functional classification, and 2 tools exhibit ambiguous use-wear.

CHAPTER 4 DISCUSSION

This chapter will synthesize and interpret the data presented in the preceding chapter in order to address questions regarding the role of Subhousepit 3 within the overall subsistence and settlement system of the Late Plateau Horizon at the Keatley Creek village, whether the same economic constraints governed the formation of this lithic assemblage as has been documented for other Late Period houses, and implications for long term trends in technological organization across the transition from dispersed to aggregated wintering conditions (Prentiss et al 2003).

The first step is to assess whether SHP3 represents a domestic structure or a special purpose structure. If the SHP3 data suggests a special function for this structure, then it must be determined what that function might be and how it relates to the larger settlement patterns of the Late Plateau Horizon. However, if the SHP3 data are consistent with a domestic structure, then it must be determined if it represents a long term or a short term occupation. Comparisons are made between the Subhousepit 3 data and data from two small housepits, Housepit 12 (HP12) and Housepit 90 (HP90). This comparative data set will serve two functions. First, it will help to establish what lithic assemblages from other documented small winter houses look like and the likely range of variation in those assemblages, and second it will facilitate interpretations regarding the effects of population aggregation on technological organization.

THE FUNCTIONAL ROLE OF SUBHOUSEPIT 3: Winter Village Pattern Fit

Using ethnographic data, Prentiss (2000) developed the winter village pattern, a model that describes the economic constraints on tool use and predicts what winter residence lithic assemblages should look like. This model was then applied to the lithic

assemblage from Housepit 7 in order to test whether similar economic and behavioral factors conditioned the lithic assemblages of ethnographic and prehistoric housepits. Certain patterns of raw material use, tool production, and discard appear to be broadly consistent for most of the houses studied at Keatley Creek (Spafford 2000b), suggesting that this model describes the majority of assemblages created from occupations of this nature. The winter village pattern will be used as a baseline for comparison to help determine if Subhousepit 3 is a long term domestic structure or a special activity structure.

If Subhousepit 3 conforms to the winter village pattern, the predominant use strategy should be prepared block core reduction, coupled with high frequencies of utilized flakes and expedient tool use with a variety of conservation techniques including serial expediency (Prentiss 2000) and bipolar reduction of exhausted cores and tools. Additionally, a wide range of tool types should be present reflecting a full suite of domestic activities. In contrast, if Subhousepit 3 was occupied for a short time or was used as a special activity structure, then a much narrower variety of tool types should be present and should reflect a more restricted range of activities than a structure that had been lived in for a period of months. Lithic debitage would not be expected to exhibit the same degree of exhaustive use as in long term occupations and lithic manufacturing would not be expected to focus so heavily on expedient technologies.

Based on the results of the analyses presented in the preceding chapter, SHP3 is generally consistent with the winter village pattern. The MSRT analysis for the debitage assemblage demonstrated robust patterning in both dacite and jasper consistent with hard hammer prepared core reduction. This data set also indicated that larger sized flakes with

acute edge angles were selectively removed from the debitage assemblage for use as tools and that the assemblage has undergone a fair degree of trampling. This is strongly indicative of a longer term occupation. Raw material conservation is indicated through platform preparation (reflected in the MSRT patterns) as well as through the presence of a single bipolar core. These two lines of evidence indicate some degree of concern with extending the use life of available raw materials, which suggests in turn a relatively limited degree of mobility that would constrain access to raw materials.

Additionally, the winter village pattern predicts high frequencies of expedient flake tools. Not including artifacts associated with lithic reduction, 75 percent of the tools recovered from SHP3 are considered expedient flake tools. The model also predicts a wide variety of tool types reflecting a broad array of activities. A total of 11 different tool types are present in this assemblage. These tools were assigned to one of three broad functional categories, woodworking, hunting and butchery, or hide working and basketry, following Hayden et al. (2000). One additional category, multiple use tools, was added. According to Hayden et al. (2000) utilized flakes, retouched flakes, and most scrapers could potentially have been used for activities that are subsumed by any one of the three functional categories he established. Where use-wear data were unavailable or inconclusive for these tool types from Subhousepit 3, they were classified as multiple use tools. Tools from all functional categories are present in Subhousepit 3, reflecting a complete suite of domestic activities. Woodworking tools, however, dominate the assemblage. These woodworking tools, a variety of scrapers, notches, and borers, are all tools used in the production and maintenance of hunting and fishing gear.

In summary, the lithic assemblage from Subhousepit 3 is highly consistent with the broad expectations laid out in the winter village pattern. Lithic reduction activities appear to be dominated by hard hammer prepared core reduction oriented towards to production of expedient flake tools. A full range of activities is reflected in the tool assemblage. The emphasis on woodworking tools could be reflective of gearing up activities immediately prior to abandonment of the house, but understandably raises questions about the potential for this to be a special activity structure. Therefore, the Subhousepit 3 data will be compared to Housepit 12 and Housepit 90, both of which have been interpreted as cold season domestic occupations (Heffner 2000; Spafford 2000a), and can therefore help to verify if SHP3 is truly a domestic structure.

FUNCTIONAL ROLE OF SUBHOUSEPIT 3: Comparison to Other Houses

Figure 4-1 shows distributions of expedient and curated tools for all three houses. When examined in this fashion, there is a remarkable degree of concurrence between the three assemblages. A chi square test for significance was run on expedient and curated tool frequencies for SHP3, HP12, and HP90. The results indicate that the distributions are not significantly different at the .05 confidence level. This reinforces the interpretation that the technological organization surrounding the occupation of SHP3 is consistent with the winter village pattern. HP12 exhibits a notably higher proportion of expedient flake tools than either SHP3 or HP90, and when this house is tested for significance against either SHP3 or HP90 alone, distributions are significant at the .05 confidence level. Two explanations are possible. First, as both Housepit 12 and Housepit 90 are widely accepted to represent long term cold season domestic structures

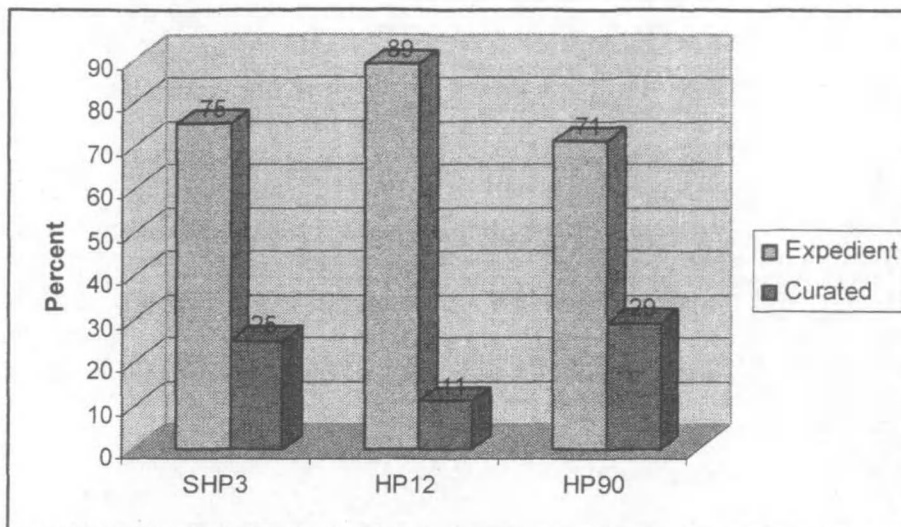


Figure 4-1. Expedient and curated tool distributions for Subhousepit 3, Housepit 12 and Housepit 90.

based on the preponderance of all available evidence, this would seem to indicate that the tool assemblages of small sized pithouses can be expected to encompass a fairly wide range of variability (Spafford 2000b). Second, this could represent a shift in the emphasis on curated technologies over time, since these three housepits span a period of approximately 300 years. However, this interpretation hinges on the fact that percentages run on the tool assemblage from Subhousepit 3 are skewed due to the very small sample of tools. In support of this second interpretation, Prentiss (2002) observed a similar trend towards an increasing reliance on curated tools through time in Housepit 7. The earliest occupations of this house, which are statistically contemporaneous with the occupation of Subhousepit 3, are marked by extremely high frequencies of expedient flakes tools and only minimal frequencies of more formally made bifacial and unifacial tools. However, later occupations of Housepit 7, post dating 1350 BP, exhibit a marked increase in reliance on more formally made curated tools. Reliable assessment of this trend in the present data set is hindered due to the small sample of tools recovered from Subhousepit

3. Only 16 tools are assignable as either curated or expedient, the other 5 tools being hammerstones and cores, and with a sample this small the addition or subtraction of a single tool from the assemblage dramatically effects percentages.

As a simple function of time, tool diversity and overall lithic densities are expected to increase with longer occupations. Where a short term occupation is expected to produce low lithic densities and low tool diversity, a long term occupation is expected to produce high lithic densities with associated high tool diversity. Alternately, a habitation reused for multiple short term occupations would be expected to have higher lithic densities, but not necessarily the high diversity in tool types and represented activities, assuming the site was reused in the same way with each succeeding occupation. A favored hunting location to which people returned year after year would be an example of this type of site. However, a site repeatedly reoccupied for longer time spans, though not for an entire season, can reasonably be expected to produce an assemblage similar to a long term occupation. A month-long occupation should show a complete range of domestic activities and have relatively high lithic densities and tool diversity, though raw material conservation would not necessarily be expected to play as large of a role in assemblage formation as in a season-long occupation.

Lithic densities were calculated for the floor strata of SHP3 by number of lithic artifacts recovered per liter of excavation. SHP3 has a floor lithic density of 1.26 artifacts per liter, in comparison to HP12 at 0.63 and HP90 at 0.38 (Spafford, 2000b). The lithic densities of SHP3 are unusually high and might be attributable to the extremely small size of the house. While the same amount of activity may have occurred in all three small houses, it occurred across a smaller overall space in SHP3, therefore resulting

in unusually high densities. There is no way to test for midden deposits associated with SHP3 due to the extremely complex site formation processes and the amount of cultural activity occurring in the vicinity of SHP3, not the least of which is the construction of HP7 over the top of SHP3. Therefore no midden deposit was identified that can be confidently linked to the occupation of SHP3. This is unfortunate, as the accumulation of debris and trash middens is a good method for testing the length of an occupation, since short term and repeated short term occupations generally do not generate enough debris to create midden deposits. Lithic density data, however, are consistent with a longer term occupation.

Table 4-1. Tool Diversity in Subhousepit 3, Housepit 12, and Housepit 90.

Tool Type	SHP3	HP12	HP90
Projectile Points	X	X	X
End Scrapers	X	X	
Scrapers	X	X	X
Utilized Flakes	X	X	X
Notches	X	X	X
Borers	X	X	
Piercers	X		X
Piece Esquillees	X		X
Bifaces	X		X
Lithic Reduction	X	X	X
Retouched Flakes		X	
Expedient Knives			X
Drills			X
Ground Stone	X		X
Total Tool Types	11	8	11

So how does tool diversity in SHP3 compare to other houses? Eleven different tool types are represented in the SHP3 tool assemblage, in comparison to 8 tool types in HP12 and 11 in HP90. Between the three houses, fourteen different tool types are represented. Five of these tool types are represented in all three houses, six are in SHP3 and one of the other houses, one (retouched flakes) is present only in HP12, and two (expedient knives and drills) are only in HP90 (Table 4-1). This data indicate that tool

diversity in SHP3 conforms well to tool diversity in other small housepits. The high degree of similarity in the tool types present in each assemblage, if not in the frequencies of those tool types, is indicative of similar types of occupations. A short term occupation, on the order of one to two weeks, would not be expected to produce such a wide array of tool types and would reflect a more focused range of activities.

Figure 4-2 shows the tool assemblages for all three houses by functional classification. The most significant difference occurs in the frequency of multiple use tools. Where multiple use tools constitute 50 percent of the HP12 assemblage and 38 percent of the HP90 assemblage, these tools only contribute 5 percent to the SHP3 assemblage. This difference is largely attributable to the paucity of utilized flakes associated with SHP3. Given that only 21 tools were recovered from the floor deposits of SHP3, the sample is suspect in terms of its representativeness of the full range of activities that could have occurred within the house. Several factors combine to confound the sample size. SHP3 is unusually small, at just 2.5 meters in diameter. This means that as a living structure all activities, from food preparation, to lithic reduction, to production and maintenance of gear, to sleeping, all occurred basically within the same space. If this structure represents anything more than a temporary living structure, cleaning and sweeping would have been a critical part of assemblage formation processes. Therefore, the materials recovered from the floor of this structure will necessarily represent only the last set of activities that occurred prior to abandonment.

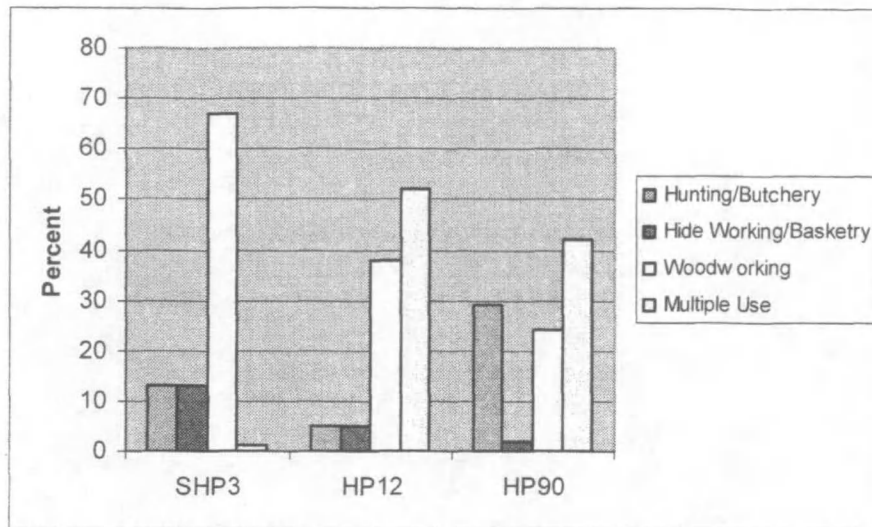


Figure 4-2. Functional classification of tools from SHP3, HP12, and HP90.

Additionally, Spafford (2000b) noted that small houses tend to exhibit high diversity in activities represented in the lithic assemblages. Since these three houses were occupied at different times over the span of 300 years, the trend towards decreasing emphasis in woodworking activities coupled with the rise of multiple use light duty tools such as utilized flakes deserves further attention. The apparent emphasis on woodworking activities should not necessarily be interpreted as indicative of a special role within the village context, especially since woodworking tools consistently contribute substantially to the tool assemblages of other houses. However, it does appear to represent a shifting focus on the frequency of different activities that occurred in winter houses over time. This interpretation is supported by data from Housepit 7 (Godin 2004) that indicates a similar trend through time, where the earliest occupation levels in Housepit 7, which are statistically contemporaneous with the occupation of Subhousepit 3, show similar high levels of woodworking tools, whereas the later occupation levels indicate a decreased focus on woodworking activities. This data, coupled with the unusually high frequency of hunting and butchering tools in Housepit

90, the latest of the three small housepit occupations at 1410 BP, suggests a shift in subsistence strategies through time, most likely from a reliance primarily on salmon fishing to hunting of large land mammals. The lithic data for Subhousepit 3 conform strongly to the winter village pattern, and when compared to the lithic assemblages of other small winter pithouses, Subhousepit 3 exhibits a fairly high degree of continuity, though evidence is present which suggests a changing focus on the kinds of non-lithic gear that is being produced or maintained in these houses over time.

SUMMARY OF FINDINGS

To summarize, tool diversity in Subhousepit 3 is consistent with that documented for other small sized housepits. While the range of activities represented is also consistent, there is an unusually high frequency of woodworking tools. Does this then represent a long term winter habitation with the full complement of domestic activities, or could it represent a longer short term occupation, on the order of a month, during which the full complement of domestic activities would occur, but which might be focused more specifically either on the production of gear for activities related to the occupation of that site or on gearing up for activities that will occur during the next phase of the seasonal round? As noted above, lithic assemblages produced through extended cold season occupations and those formed through shorter duration long term occupations, such as a month-long stay, would be expected to produce similar lithic assemblages when measured by activity and tool diversity. Lithic densities should generally be higher for seasonal occupations, but the main differentiating factor would be the degree of raw material conservation and exhaustive use and reuse of materials. These activities are expected to play a much larger role in the formation of seasonal occupations due to

highly constrained access to lithic raw materials. Occupations of shorter duration would not be constrained to the same degree. Therefore, based on the preponderance of lithic evidence, Subhousepit 3 is indistinguishable from a typical cold season domestic structure. Lithic manufacture is focused on the production of expedient flake tools from prepared block cores. Lithic densities are high, tool diversity is high, and a full complement of domestic activities are represented. The presence of a bipolar core suggests exhaustive use of available material, and raw material conservation is indicated by the number of tools which have multiple worked edges, suggesting the practice of serial expediency (Prentiss 2000). In fact, two flake tools account for five different tool types, due to the reuse of different edges for different purposes. One flake tool was used as an inverse scraper, a unifacial borer, and a small piercer. The other flake tool is both a double scraper and a notch. Other flake tools used in a serially expedient manner include two scrapers with multiple used scraper edges and two distinct utilized margins on the knife-like biface. The number of flake tools with multiple used edges is strongly suggestive of lithic material conservation practices. Despite the size and structural differences apparent in the construction of Subhousepit 3 from other archaeologically documented winter residences, there is nothing in the lithic assemblage to indicate that this house was anything other than a winter-long residence. This interpretation is strengthened by the botanical materials recovered from SHP3 which are similar in content to botanical materials recovered from other housepits and which indicate a late warm season to cold season occupation (Lyons 2003).

DISCUSSION

Lithic technological organization does not fundamentally change across the transition from dispersed to aggregated wintering conditions, as demonstrated by the remarkable degree of consistency between the lithic assemblages of Subhousepit 3, Housepit 12, and Housepit 90, and the good fit between Subhousepit 3 data and the winter village pattern. Why, given the major demographic shift which occurs just after Subhousepit 3 was abandoned and the dramatic social reorganization that occurs, do lithic manufacturing strategies remain constant?

Factors influencing how a technology is organized, or how is it produced, used, reused, and discarded, include raw material quality and availability (Bamforth 1986, 1990, 1991; Andrefsky 1994), as well as mobility strategies (Bamforth 1986; Kelly 1988; Parry and Kelly 1987), which in turn is governed by the structure of the resource base (Binford 1981). What this then suggests is that despite a shift in mid-Fraser regional settlement patterns that began to locate larger numbers of people in winter villages along major river valleys (Prentiss et al 2003; Lenert 2001), overall mobility patterns based on warm season mobility and cold season sedentism did not significantly change. Thus, access to different lithic materials did not change. The broad practical parameters within which these materials were utilized remained constant.

This is not to say that fluctuations in subsistence resource utilization and mobility strategies did not occur, just that if changes did occur they are not unquestionably evident in the ways in which lithic materials were manufactured, used, and discarded in winter houses. Beginning during the Shuswap Horizon and continuing all the way through to ethnographic times, the subsistence economy of groups living on the Canadian Plateau

has been comprised of three staple resources, salmon, large land mammals such as deer and elk, and roots and berries (Richards and Rousseau 1987; Teit 1900; 1906). Ethnographically, both salmon and roots and berries were critical stored resources that enabled people to remain sedentary throughout the winter (Teit 1900; Turner 1978). Therefore, mobility strategies have been organized around making use of all of these resources and scheduling access to them during their respective periods of availability.

However, there is evidence that fluctuations occurred through time in the degree people relied upon each of these resources. Pokotylo and Froese (1983) have demonstrated a change in the degree and intensity of root gathering in the Hat Creek Valley, just on the other side of the Clear Range from Keatley Creek, through time, with the peak period of intensification occurring between 2300 and 1200 years ago. More recently, Burns (2003) has documented a shift in subsistence strategies through time in the rim deposits of Housepit 7. While the faunal profiles of the earliest rim deposits, contemporaneous with the occupation of Subhousepit 3, are composed primarily of salmon remains, there appears to be an increasing reliance on and intensive processing of mammalian resources through time. Burns links this with the introduction of bow and arrow technology to the mid-Fraser region at c.a. 1500 BP.

This same trend is visible in the faunal profiles of Subhousepit 3, Housepit 12, and Housepit 90 (Figure 4-3) and is generally reflected in the lithic tool profiles when examined by broad functional category (Figure 4-2), where hunting and butchery tools contribute minimally to the Subhousepit 3 tool assemblage, are marginally represented in Housepit 12, and are a major contributing factor in the tool assemblage in Housepit 90 at 29 percent. Therefore, changes in subsistence strategies over the course of the Plateau

Pithouse Tradition are best characterized as a matter of degree and not of kind. The implication of this is that lithic profiles may change in the relative frequencies of different tool classes through time in response to shifting emphases in subsistence strategies, but the same practical parameters that govern how tools are produced, used, and discarded never fundamentally change. People are still moving across the landscape in response to the timing of availability of the same subsistence resources. This is why despite archaeologically detectable changes in settlement (i.e. the aggregation) and subsistence, technological organization remains constant.

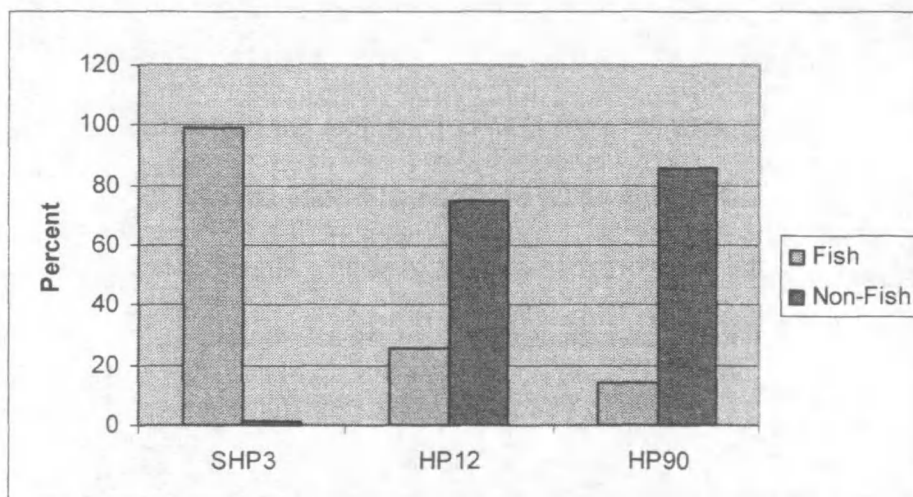


Figure 4-3. Comparison of fish to non-fish faunal remains from Subhousepit 3, Housepit 12, and Housepit 90.

CHAPTER 5 CONCLUSION

The temporal positioning of Subhousepit 3, just prior to a major demographic shift in the mid-Fraser region of British Columbia, makes it an ideal case for examining the effects of population aggregation on cultural adaptations in the mid-Fraser region.. This thesis focused on the organization of lithic technology within this house, and compared the results to two other known small winter housepits that date to just around the onset of aggregation (Housepit 12 at 1550 BP) and slightly after the onset of aggregation (Housepit 90 at 1410 BP). It was determined that technological organization did not fundamentally change across this demographic transition because the guiding parameters which structure the organization of a lithic technology, including mobility strategies and access to lithic materials, remained relatively constant. Where prior to the population aggregation people appear to have wintered over in smaller more dispersed groups than during the period of aggregation, the fundamental mobility patterns governed by the timing of resource availability were not altered.

Perhaps the most significant implication of this study lies in the apparent limits of lithic technological organization data. It was hoped at the outset that some change in lithic manufacturing, use, and discard strategies could be identified and linked to the process of population aggregation and that that information could be used to address larger questions surrounding long term fluctuations in hunter-gatherer adaptations on the Canadian Plateau. This turned out not to be possible. While evidence exists that indicate shifting frequencies of activities performed in winter houses over time that appear to be directly related to shifting emphases in subsistence resource exploitation, the economic constraints governing how lithic tools were manufactured, used, and discarded did not

change. This indicates that small scale fluctuations in environmental conditions and the subsistence resource base should not necessarily be expected to be reflected in the organization of a lithic technology. Only in cases where a major subsistence resource is newly made available or eliminated from the environment, either forcing human groups to alter their mobility patterns to compensate for the loss of major resource or to include a new resource into the scheduled rounds, should lithic technological organization be expected to be significantly affected. To track more moderate fluctuations in settlement and subsistence systems other lines of evidence, such as faunal and botanical data, should be employed. These data classes are more directly linked to environmental conditions and thus are more sensitive to and informative of smaller scale changes in subsistence resource utilization, and by extension, mobility and land use patterns.

The assumption underlying our conception of the Plateau Pithouse Tradition (Richards and Rousseau 1987) is that the use of pithouses necessarily indicates seasonal sedentism. No formal evaluation of pithouses spanning this cultural tradition has been undertaken, and therefore the relationship between pithouses and low residential mobility for the entire span of the Plateau Pithouse Tradition has yet to be demonstrated. Two recent studies of Archaic Period pithouses from Wyoming (Larson 1997; Smith 2003) have demonstrated through formal analyses that these structures were constructed by highly residentially mobile groups with stable land use patterns, thereby dispelling the untenable assumption that structures must necessarily correlate to sedentism. These studies should serve as warning to Canadian Plateau archaeologists about the same assumption inherent in their work.

Future research involving Subhousepit 3 should use the faunal and botanical profiles as independent tests of the conclusions reached in this thesis. Do the faunal and botanical profiles match what would be expected from a winter long residence or could they reflect a different degree of mobility? How do these data sets compare to Housepits 12 and 90 and what does this tell us about long term fluctuations in subsistence?

One of the major drawbacks to this analysis is the lack of a substantial body of comparative data. Only a handful of houses have been completely excavated at Keatley Creek and this analysis used only data from other similarly small sized houses that date to a relatively narrow time span right in and around the period of population aggregation. This was done to ensure that if changes were observable in the lithic assemblages, that those changes could be reasonably considered effects of the population aggregation on lithic manufacturing strategies and not a by-product of differing socio-economies in radically different sized houses. This approach resulted in only two other houses that could be used for comparison and rests on the assumption that the lithic assemblages in all of these three small houses are representative of lithic assemblages in small houses from each of the time periods they represent. A larger sample of small sized houses from these time periods could help to resolve the issue of whether the variations in tool assemblages and functional classes noted in Chapter 4 are truly significant as regards subsistence fluctuations, or if this variation is acceptable in terms of the range of variation of activities that can be expected to occur within these small houses.

Based on the evidence presented and discussed in this thesis, if the process of population aggregation affected cultural systems in the mid-Fraser region those affects were subtle enough to not fundamentally influence the ways in which people made and

used stone tools. A tentative trend towards increasing reliance on curated tools was noted, but requires further data and larger samples before this trend can be demonstrated to be truly reflective of changing behavior. This thesis focused on only one portion of the cultural materials recovered from Subhousepit 3. More remains to be learned about this house and the effects of the demographic transition on cultural systems in the mid-Fraser region.

APPENDIX A: FLAKE CULLING AND TRAMPLING INDICES

Table A-1. Prepared Block Core (Medium Flake Goal) Utility Indices (from Prentiss 1993).

		Utility Indices							FVixAAEL Index		FVixHAEL Index	
	Raw Data (1)	Resc. (2)	FVI (3)	AAEL (4)	HAEL (5)	FVI Resc. (6)	AAEL Resc. (7)	HAEL Resc. (8)	FVixAAEL (9)*	Resc. (10)	FVixHAEL (11)	Resc. (12)
Large												
CF	1.0	11.1	273.4	0.0	100.2	100.0	0.0	100.0	0.0	0.0	2739.5	100.0
Medium												
CF	5.0	55.6	41.4	30.6	33.1	15.1	94.4	33.0	126.7	71.8	137.0	5.0
PF	4.0	44.4	89.5	19.7	47.8	32.7	60.8	47.7	176.3	100.0	427.8	15.6
MDF	2.0	22.2	76.7	9.9	83.7	28.1	30.6	83.5	75.9	43.1	642.0	23.4
SF	2.0	22.2	25.4	27.7	28.5	9.2	85.5	28.4	15.0	8.4	72.4	2.6
Small												
CF	1.0	11.1	2.2	32.4	0.0	1.0	100.0	0.0	7.1	4.0	0.0	0.0
PF	8.0	88.9	1.8	9.1	18.8	1.0	28.1	18.8	1.6	1.0	3.4	0.1
MDF	9.0	100.0	2.7	18.8	30.6	1.0	58.0	30.5	5.1	2.8	8.3	0.3
NF	1.0	11.1	2.3	5.5	27.8	1.0	17.0	27.7	1.3	1.0	6.4	0.2
SF	6.0	66.7	4.0	7.9	21.8	1.5	24.3	21.8	3.2	1.8	8.7	0.3

* Data divided by 10.

CF=Complete Flake, PF=Proximal Fragment, MDF=Medial/Distal Fragment, SF=Split Flake, NF=Non-orientable Fragment; Resc.=Rescaled.

Table A-1. Continued.

Residual Indices												
FVI Residual Index				AAEL Residual Index			HAEL Residual Index			FVI x AAEL Residual Index		
	100-FVI Resc. (13)	Col. 13 x Col. 2 (14)	Resc. (15)	100- AAEL Resc. (16)	Col. 16 x Col. 2 (17)	Resc. (18)	100- HAEL Resc. (19)	Col. 19 x Col. 2 (20)	Resc. (21)	100-FVI x AAEL Resc. (22)	Col. 22 x Col. 2 (23)	Resc. (24)
Large												
CF	0.0	0.0	0.0	100.0	111.0	17.4	0.0	0.0	0.0	100.0	111.0	11.4
Medium												
CF	84.9	472.0	47.7	5.6	31.1	4.9	67.0	372.5	51.6	28.2	156.8	16.1
PF	52.2	231.7	23.4	39.2	174.1	27.2	52.3	232.2	32.2	0.0	0.0	0.0
MDF	71.9	159.6	16.1	71.9	159.6	25.0	16.5	36.6	5.1	56.9	126.3	13.0
SF	90.8	201.6	20.4	14.5	32.2	5.0	14.5	32.2	4.4	91.6	203.4	20.9
Small												
CF	99.0	109.9	11.1	0.0	0.0	0.0	100.0	111.0	15.4	96.0	106.6	11.0
PF	99.0	880.1	88.9	71.9	639.2	100.0	81.2	721.9	100.0	99.0	880.1	90.5
MDF	99.0	990.0	100.0	42.0	420.0	65.7	69.5	695.0	96.3	97.2	972.0	100.0
NF	99.0	109.9	11.1	83.0	92.1	14.4	72.3	80.3	11.1	99.0	109.9	11.3
SF	98.5	657.0	66.4	75.7	504.9	79.0	78.2	521.6	72.2	98.2	655.0	67.4

CF=Complete Flake, PF=Proximal Fragment, MDF=Medial/Distal Fragment, SF=Split Flake, NF=Non-orientable Fragment; Resc.=Rescaled

Table A-1. Continued.

Residual Indices Cont.				Trampled Residual Indices									
FVI x HAEL Residual Index			Trampled Data		Trampled FVI Residual Index		Trampled AAEL Residual Index		Trampled HAEL Residual Index		Trampled FVIxAAEL Residual Index		
100 - FVI x HAEL Resc. (25)	Col. 25 x Col. 2 (26)	Resc. (27)	Raw Trampled Data (28)	Resc. (29)	Col. 13 x Col. 29 (30)	Resc. (31)	Col. 16 x Col. 29 (32)	Resc. (33)	Col. 19 X Col. 29 (34)	Resc. (35)	Col. 22 x Col. 29 (36)	Resc. (37)	
Large													
CF	0.0	0.0	0.0	1.0	6.7	0.0	0.0	67.0	16.0	0.0	0.0	67.0	6.9
Medium													
CF	95.0	528.2	53.0	3.0	20.0	169.8	17.2	11.2	2.7	134.0	19.3	56.4	4.8
PF	84.4	374.7	37.6	6.0	40.0	208.8	21.1	156.8	37.3	209.2	30.1	0.0	0.0
MDF	76.6	170.3	17.1	3.0	20.0	143.8	14.5	143.8	34.2	33.0	4.7	113.8	11.7
SF	97.4	216.2	21.7	1.0	6.7	60.8	6.1	9.7	2.3	5.7	0.9	61.4	6.3
Small													
CF	100.0	111.0	11.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PF	99.9	888.1	89.1	7.0	46.7	462.3	46.7	335.8	80.0	379.2	54.6	462.3	47.6
MDF	99.7	997.0	100.0	15.0	100.0	990.0	100.0	420.0	100.0	695.0	100.0	972.0	100.0
NF	99.8	110.8	11.1	1.0	6.7	66.3	6.7	55.6	13.2	48.4	7.0	66.3	6.8
SF	99.7	665.0	66.7	1.0	6.7	66.0	6.7	50.7	12.1	52.4	7.5	65.8	6.8

CF=Complete Flake, PF=Proximal Fragment, MDF=Medial/Distal Fragment, SF=Split Flake, NF=Non-orientable Fragment; Resc.=Rescaled

Table A-1. Continued.

Trampled Residual Indices			Trampled Utility Indices									
Trampled FVIxHAEL Residual Index			Trampled FVI Index		Trampled AAEL Index		Trampled HAEL Index		Trampled FVI x AAEL Index		Trampled FVI x HAEL Index	
Col. 25 x Col. 29 (38)	Resc. (39)		Col. 6 x Col. 29 (40)	Resc. (41)	Col. 7 x Col. 29 (42)	Resc. (43)	Col. 8 x Col. 29 (44)	Resc. (45)	Col. 10 x Col. 29 (46)	Resc. (47)	Col. 12 x Col. 29 (48)	Resc. (49)
Large												
CF	0.0	0.0	67.0	51.2	0.0	0.0	67.0	22.0	0.0	0.0	67.0	100.0
Medium												
CF	190.0	19.1	30.2	23.1	188.8	32.6	66.0	21.6	143.6	35.9	10.0	14.9
PF	337.6	33.9	130.8	100.0	243.2	41.9	190.8	62.6	400.0	100.0	62.4	93.1
MDF	153.2	15.4	56.2	43.0	61.2	10.6	167.0	54.8	86.2	21.6	46.8	69.9
SF	65.3	6.5	6.2	4.7	57.3	9.9	19.0	6.2	5.6	1.4	1.7	2.6
Small												
CF	0.0	0.0	0.0	0.0	131.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PF	466.5	46.8	4.7	3.6	580.0	22.6	87.8	28.8	4.7	1.2	0.5	0.7
MDF	997.0	100.0	10.0	7.6	11.4	100.0	305.0	100.0	28.0	7.0	3.0	4.5
NF	66.9	6.7	0.7	0.5	0.0	2.0	18.6	6.1	0.7	0.2	0.1	0.2
SF	66.8	6.7	1.0	12.4	16.3	2.8	14.6	4.8	1.0	0.3	0.2	0.3

CF=Complete Flake, PF=Proximal Fragment, MDF=Medial/Distal Fragment, SF=Split Flake, NF=Non-orientable Fragment; Resc.=Rescaled

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